

## Shades of Collaboration

Australasian Neuroscience Society Early and Mid Career Researchers  
Collaboration workshop

### Abstract

In his *Shades of Collaboration* speech, Alan will describe what he values in collaboration, what concerns him about overemphasis on collaboration, and the secrets he has learned from his years in research, business and providing policy advice to governments.

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Let me say up front, I enjoy collaborating and most of my success has benefitted from collaboration, but I never use the word unless asked and I never think about it unless poked.

Collaboration is just what you do. It is a tool, not an end point. From that point of view, it is unfortunate that it needs to be spoken about so much.

If you want to be healthy, there are many things you have to do: exercise regularly, eat well, think kind thoughts, sleep long hours, work hard and enjoy your play.

If you want to be successful, there are many things you have to do: be an expert at something, be prepared to compete, collaborate. Let's look these three items in some detail.

The first I mentioned was "be an expert at something". Just being smart isn't enough.

When I was asked in 2016 by the Australian Government to lead the review into the national electricity system after the blackout in South Australia, the first thing I did was visit the head of the Department of Energy, Gordon de Brauer, who introduced me to James Chisholm, his pick to lead the taskforce that would support me in the project.

After we mapped out our approach, James said he would put out a request for expressions of interest to find volunteers for the taskforce. He asked me if I wanted to join him in the interviews.

No, I replied, as long as you promise me that you won't just pick smart people. I don't want to walk into a room full of smart people who don't know anything. I want to walk into a room full of smart people, where every single one of them is an expert at something: markets, regulatory affairs, standards, economic modelling, electrical engineering.

James delivered. The team was fantastic, and we achieved a huge amount.

This is what's needed in science, too. In the late 1990s I assembled a team to make a high-throughput confocal microscope for medium throughput cell-based screening in pharmaceutical companies.

We had a PhD in optics who designed custom glass objectives, we had an expert in embedded firmware, some mechanical engineers, some electronics engineers, some data base engineers, some user interface engineers, a lab scientist, a lab technician and a project manager.

Every single one of them was an expert, with good communications skills and willingness to work collaboratively in a team. The project was highly successful and achieved excellence that would have been impossible to achieve by a team of generalists.

The second item in my list was “be prepared to compete”. Not everybody can be a winner, it’s a game of probabilities, but if you don’t dive in and compete, your probability of success will be zero.

You might choose to compete against yourself, to do better than you have ever done before. You might compete with another lab, aiming to publish first. The competition in the development of calculus, the conquest of space, and refinement of CRISPR technology led to great leaps forward.

The third item in my list of tips for success was to “collaborate”. Not for the sake of it. But because you have identified somebody to collaborate with.

Somebody who knows more than you do about at least one important aspect of your project.

Somebody who has more experience than you.

Somebody who will bring out the best in you.

Somebody who shares ambitions with you.

Somebody who shares your excitement.

But there is a problem. The problem is that governments and administrators have developed a mistaken belief that collaboration automatically leads to success. They believe in a causative relationship. But the data to support that belief often confuses correlation with causation. It certainly does not unpick the relative contributions of correlation and causation.

Based on that belief, in many cases governments and funding agencies worldwide have made collaboration a requirement for grants and other support. But this comes at the expense of encouraging competition, an unfortunate oversight. You only have to look at the real world to see the crucially important contribution to progress made by competition.

Look at Silicon Valley. On the surface of it, it is the most ferocious jungle of competition imaginable, and also the most prolific font of successful, transformational, technology companies ever. Almost beyond imagination.

But it would be simplistic to imply that the fiercely competitive companies out of Silicon Valley don't collaborate. It is just that they don't collaborate with their competitors! Instead, they collaborate through supply agreements and consultation agreements.

I know that from first-hand experience, having founded then led a Silicon Valley company for 23 years. We competed, we collaborated, we were successful.

Based on that success, I put it to you that it would be foolish to believe that the path to success is collaboration, or to think that instead the path to success is competition. That would be a false dichotomy. Both are important.

When I started in 2016 as Australia's Chief Scientist, everybody wanted me to charge into battle on two fronts: innovation and collaboration.

I soon realised that there is nothing less innovative than talking again and again about innovation. Innovators innovate! They are too busy to talk about innovation.

And I soon realised that the focus on collaboration as a means to an end was in pursuit of something easy to mandate but difficult to optimise.

An even bigger problem is that the international metrics on collaboration between businesses and universities are deeply flawed. For that reason, I led a metrics review that, if adopted, will see much better metrics used by the Australian Government to monitor the success of its funding programs.

Collaboration comes in several categories. At the highest level, it is split into the marriage-of-convenience variety *versus* the marriage-of-love variety.

Collaboration works well when the participants see and desire the synergies – that's the marriage-of-love collaboration.

On the other hand, collaboration does not work as well when the participants are given no option if they want the funding – that's the marriage-of-convenience collaboration.

For example, when you are asked to join a research project because the grant requirement says there must be at least two universities involved. Or when you hear the suggestion, "You can be an author on my paper if you add me as an author on your paper."

What you must avoid is collaboration for collaboration's sake.

My favourite, and particularly relevant marriage-of-love collaboration was the work I did as a postdoctoral research fellow at the Australian National University, with Steve Redman and David Hirst.

My PhD just prior to that was rather lonely. I worked on voltage sensitive chloride selective ion channels in *Helix Aspersa*, but I was somewhat awkwardly doing my research in the Department of Electrical Engineering, for an engineering doctorate.

I was provided guidance and support, but not collaboration. The guidance came from my PhD supervisor, Professor Steve Redman and some of his colleagues in the Department of Physiology in the Science Faculty, including Professor David Hirst.

The support came from the Department of Electrical Engineering. The philosophy of the head of the Department could be summarised as “Alan, you can have the best equipment in the world. As long as you design and build it yourself!”

And that’s how it went, but I was well supported by expert staff and superbly equipped mechanical and electronics workshops.

My postdoc was the opposite. Steve Redman and David Hirst both moved to the John Curtin School of Medical Research, where Steve was appointed the Director of the new division of neuroscience. I moved, too, as a postdoctoral research fellow.

This time round I worked closely with Steve and David. Steve’s work was on synaptic connections in motor neurons deep in the spinal cord, only achievable with a single electrode voltage clamp.

David and his collaborator Dirk van Helden were studying mouse brain ganglion cells, too small to be studied with anything other than a single electrode voltage clamp.

In both cases, the collaboration benefitted from our complementary skills. They cared about the biology, and they suffered the agony of failed experiments and the thrill of successful ones.

I cared about the electronic design of the single electrode voltage clamp. I suffered the agony of my own dumb design errors, and the thrill of making enhancements that expanded the boundaries of what was possible.

Below that high level split, there are several specialist forms of collaboration.

To start, there is pre-competitive collaboration.

The Japanese made it famous when developing the videotape recording industry and semiconductor memory industry. Basically, all the Japanese companies interested in videotape recording were funded by the government to collaborate to develop the core technology.

Then they were sent off to compete like crazy. Compete with each other, and with the rest of the world.

I rate that a ten out of ten.

Next, there is collaboration for purpose.

Fundamentally, it's when you can say, "Let's work together because your skills and my skills are complementary and together we can do more, faster, than we could apart."

I rate that a ten out of ten, too.

And finally, there is adversarial collaboration.

This is something I only learned about recently. It is formally described as collaboration where "two or more scientists with opposing views work together." <sup>i</sup>

Let me give you a current example in neuroscience.<sup>ii</sup> There are two competing theories of consciousness currently attracting lots of attention. I don't understand either of them.

One is called "Global Neuronal Workspace Theory", proposed by Bernard Baars, and the other is called "Integrated Information Theory", proposed by Giulio Tononi.

The adversarial collaboration project is led by Lucia Melloni at the Max Planck Institute in Germany.

How do I even know about this? Because my science-writer wife, Elizabeth Finkel, is using the study of consciousness to illustrate a story about the process of scientific proof.

As it happens, I am not convinced that neuroscience is ready to tackle consciousness theory. I suspect the research is about 100 years too early. But it is legitimate to try, and this adversarial collaboration project will at the very least advance the discussion.

I am not sure how to rate adversarial collaboration, so I will give it a hesitant seven out of ten.

Let's stop to consider what are the hallmarks of successful collaboration.

To start, there is critical mass. That is, if you are going to pull a new team together you might as well aim for the dream team.

Another important hallmark is shared aspirations, also known as targets. Targets can be emotional. For example, in the climate debate, the United States says that without targets, actions are irrelevant.

Personally, I believe that ambition is the combination of targets, an implementation plan and implementation in practice. Countries should be judged on all three.

But the targets must be well defined. A friend once told me that "most people aim at nothing and hit it with unerring accuracy."

Please, young scientists, define your targets well, before you start to plan your experiment or assemble your team.

Define meaningful targets, like characterising the mechanism of action of a recently observed phenomenon. Your pursuit of meaningful targets, if successful, will lead to improved personal metrics, such as your H-Index.

The point is that a high H-Index should emerge from your pursuit of meaningful targets, rather than from directly pursuing a high H-Index as the target.

Another hallmark of successful collaboration is hearing each other's voices. Everybody should have the opportunity to contribute to the planning.

Finally, there needs to be fair allocation of tasks based on skills, time and resources

There are many other factors that contribute to successful research. To start, let's look at other C words that contribute to success.

We've already discussed the collaboration C word and the competition C word.

Of course, there is the curiosity C word. Success thrives on that raging desire to learn more.

Here is another C word: communication. Don't rush your publications, be prepared to write and re-write until they are crystal clear.

And the final C word for now: consultation. The most visible aspect of all the reviews I have led for the Government, and there have been many, is wide consultation. My starting premise is that there are an infinite number of experts out there who know more than I do about every aspect of the field under review.

There are other things that contribute to successful research. You also need to know how to delegate. You can't do it all, and you want the other contributors to do more than you could have hoped for. Delegation is difficult, let's leave that as a topic for another speech.

Of utmost importance is the last minute. If it weren't for the last minute, nothing would ever get done. Don't panic as the last minute approaches; use it.

The corollary of the last minute is adrenalin. Again, use it.

Another important factor in success is knowing your patience quotient. Everybody is different. For example, I don't have the patience to work on consciousness, or quantum computing, or hydrogen fusion.

On the other hand, I am more patient than most computer programmers, who live in a world of instant gratification in which they cycle through writing, compiling and testing every few minutes.

And now, for some general life advice.

First, I am often asked, do I have a strategy in life? The answer is yes. Do I have a plan? No.

My strategy is to do whatever I am doing to the best of my ability. Opportunities arise and I step through the doors of opportunity.

But I've never had a vision for where I will end up.

So, if you have a vision for where you want to get to – Vice Chancellor perhaps, or Laureate Professor – that's great, but optional. What's essential is that everything you undertake you do to the best of your ability.

Second, social media.

I don't use it because fifteen years ago when I was the Executive Chairman of Cosmos Magazine, we set up our first online version. Cosmos is a public-good publication covering popular science, yet behind the veil of anonymity some readers took the opportunity to make comments with evil intent, just because they could. It was vitriol. Like I hear about in Twitter storms.

On the other hand, last month a friend sent me a copy of a tweet that made me smile. The tweeter said, "OMG, I just found out that Albert Einstein was a real person!! All this time I thought he was a theoretical physicist."

If all tweets were as clever as that one, I would become an active Twitter enthusiast. But they're not, therefore I will remain aloof.

So, use social media if you cannot be without it, but be cautious.

Third, think about the unintended consequences of your decisions.

I don't have a neuroscience example, but I am shocked by the short term thinking of climate change advocates who put pressure on oil and gas companies for them to divest their oil and gas production wells.

The activists took Royal Dutch Shell to court and won, and now Shell is divesting itself of oil and gas wells. They put shareholder pressure on ExxonMobil and BHP to do the same.

But there is an unintended consequence! Every oil or gas well those companies divest is purchased by a buyer. That buyer is typically an unlisted company or a state run company, neither of them accountable to shareholders or reporting to the public.

The end result is that the same oil and gas wells continue to be operated, but by less accountable operators. The unintended consequence is worse than the status quo.

There are better alternatives, like pressuring public companies to invest in solar, wind and battery production rather than new oil and gas wells, and pressuring them to purchase electric vehicles for their fleets, and solar and wind electricity for their mine and factory operations.

Think deeply, not shallowly, so that you will anticipate the unintended consequences of your actions and spend less time digging yourself out of holes.

Fourth, accept what people say for the good intentions in their words, rather than search for offensive interpretations.

How often has something you said been misinterpreted, such that the listener hears something malign rather than your original intent? Probably quite often.

But have you stopped to think how often you yourself have misinterpreted something a friend, loved one, a colleague or even a politician said?

So, train yourself to look for the good rather than the bad in what you hear.

Fifth, make a relentless commitment to quality.

When I started Axon Instruments in Silicon Valley, before many of you were born, there were existing competitors.

When I had finished my first microelectrode amplifier design, I discovered that the component and direct costs in were more expensive than the retail price of the competition. Add the overheads and financial costs and I was dead in the water. Houston, we have a problem.

I called my businessman stepfather in Melbourne and sought his advice.

He asked me if my product was better than the competition. Absolutely yes, was my answer. Then charge what you have to, he said, and keep in mind that "Quality is remembered long after price is forgotten".

So, whether it is your experimental method or the paper that you write, let a relentless commitment to quality be your credo.

Sixth, keep the facts on your side. Facts are your friend, your saviour.

If you exaggerate, somebody will put you back in your box.

If you lie, unless you have photographic memory and unlimited hubris, you will be caught out.

The more you argue your case on the basis of facts rather than ideology, the more your reputation will strengthen.

So, never take a shortcut. Stick with the facts.

Seventh, always respond to disrespect with respect.



There are a lot of rude people out there. Don't be one of them.

Nothing wastes human energy and time more than a dialogue where the two proponents are talking past each other, or even worse, they are not respectful of each other.

But it happens again and again. You will be hurt by disrespectful comments. But do not respond in kind. A disrespectful response by you demeans you personally, spirals into tit for tat arguments, and is an inefficient use of your time.

So, even though it might be unnatural, respond to disrespect with respect.

Eighth, work hard, play hard.

In particular, when it comes to work, Indira Gandhi captured it well. She said, "There are two types of people in this world: those who do all the work, and those who take all the credit. It's better to be in the first group because there is less competition."

And if you are stressed by work, don't go off for a massage. Instead, finish the task at hand. That is, if you are offered an easy option, don't take it unless it also happens to be the best way to proceed.

Ninth and last, let's talk about BS detectors.

Your best friend is your inbuilt pair of BS detectors, those little antennae connected to your scalp at the top of your head, tuned to vibrate in proportion to the nonsense around you.

You never know where the next onslaught of nonsense will come from. Sadly, there is no systematic filter out there to protect you.

Will peer review do the filtering for you? Sometimes, but not always.

When it comes to publications, quality is more of a vexed issue than ever before.

We used to use impact factors to rate the quality of journals, and we had university librarians who consulted professors before deciding to spend a lot of money to subscribe to a new journal. These ensured that pretty much every journal had a modicum of editorial quality.

But now, with open access and pay to publish, the world is swamped with papers ranging from rubbish to superb. How do you separate them?

The answer is that there is virtually no systematic way to separate the good from the bad. You have to be your own judge, always on alert, using your own BS detectors to judge the quality of what you read even if it is published in a highly reputed peer reviewed journal.

Will your friends on social media do the BS filtering for you? Unlikely. In reality, from little piles giant piles grow.

The energy source to run your BS detectors is logic. It is a magic energy source, in that no matter how much you use, it will never run out.

The moral? Whatever you do, never fully retract your BS detectors.

By now I will have completely pushed my earlier comments about collaboration out of your minds, so let me finish by quickly recapping three of my pieces of advice on collaboration.

First, never collaborate for collaboration's sake. Instead, choose your collaborations so that the whole will be greater than the sum of the parts.

Second, and equally important, don't become a slave to the collaboration mantra and thereby forget that respectful competition is healthy.

And third, when collaborating, build teams of experts rather than teams of generalists.

Young scientists, I hope at least a little of this advice will be helpful.

May the Force be with you.

Thank you

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<sup>i</sup> Adversarial collaboration definition: [https://en.wikipedia.org/wiki/Adversarial\\_collaboration](https://en.wikipedia.org/wiki/Adversarial_collaboration)

<sup>ii</sup> Consciousness: <https://www.templetonworldcharity.org/projects-database/accelerating-research-consciousness-adversarial-collaboration-test-contradictory>