

Creativity@home

How to maximise the benefit from your EPSRC grant

The Silver Bullet Machine Manufacturing Company Limited

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Silver Bullet is a specialist consulting firm, working exclusively in the areas of organisational creativity and innovation. We are fortunate to have been selected as a preferred supplier for the EPSRC's Creativity@home programme, which provides funds to programme grant holders, platform grant holders, and CDTs to enrich and enhance the team's creativity.

At which point, you might be thinking “Why do research scientists ‘need’ to enrich and enhance their creativity? Aren't we pretty creative to start with?”

Yes, scientists are indeed creative. But that does not imply that there is no benefit to be gained by enriching and enhancing an already strong attribute...

So, to explain what this is about, and how this can happen, we have prepared this brochure in which you will find

- an introduction to the Creativity@home programme (pages 2 to 6)
- some information on how a Creativity@home programme can work in practice (pages 7 to 16)
- an introduction to *Silver Bullet* (pages 17 to 19)
- a brief introduction to the key principles that underpin our approach to creativity and innovation (pages 20 to 34)
- some representative examples of the ‘exercises’ we use at our problem-solving workshops (pages 35 to 41)
- some concluding remarks (pages 42 to 44).

Introducing Creativity@home

Creativity@home

In 2010, the EPSRC launched its Creativity@home scheme, described on the EPSRC website* as “a new initiative to generate and nurture creative thinking that might lead to potentially transformative research”, with these stated objectives:

- Learning a range of creative problem solving tools and techniques and how this might aid creativity in research.
- Exploring the future research vision and cross-disciplinary opportunities in the group using new facilitation tools and techniques.
- Engaging post-doctoral and post-graduate researchers in blue skies idea generation in particular, ensuring EPSRC sponsored students are encouraged to cultivate and develop their creative thinking skills - thus enhancing their training experience.
- Learning how to work effectively in teams, understanding different styles of approaching problems / challenges and how to influence others.
- Developing a cohort of trained people that have learnt and are applying creative problem solving techniques so that the approaches and culture become embedded in the group, centre, departments, institutions...

Silver Bullet is proud to be a preferred supplier to this programme, and so the purpose of this document is to provide an overview of what we do, how we do it, the principles underlying our work, and - most importantly - how you and your team can gain significant benefits from working with us on a Creativity@home programme designed specifically for you.

*<http://www.epsrc.ac.uk/funding/howtoapply/routes/network/ideas/creativityathome/>

“Learning creative problem solving tools”

To many scientists, the first of the EPSRC’s objectives

- **Learning a range of creative problem solving tools and techniques and how this might aid creativity in research.**

could well appear not only patronising but also insulting. Science, after all, is intrinsically creative, and scientists exercise their creativity every day. And that reference to ‘learning’ might imply that there is something that needs to be learnt, which further implies that scientists might, in some way, be ‘deficient’. That really is insulting!

Indeed so. But at *Silver Bullet*, we’re quite sure that the intent of the EPSRC is neither patronising nor insulting - rather, the intent is that, however creative any one is, there is always the opportunity to become even more creative, and to help develop the creativity of others who are perhaps rather less self-confident in this regard. After all, even Olympic athletes have coaches.

One way in which creativity can be enhanced is by becoming more alert to precisely what creativity is, and how creativity happens. This increased alertness transforms an apparently natural, ‘subconscious’, intuitive act into a deliberate, well-focused and structured action, so making creativity much more productive and effective. Which is surely a good place to be. That’s why the EPSRC refers to ‘learning’ - by enriching our understanding of the fundamental nature of creativity, we can all generate more, better ideas, and continue to do this more often and with more confidence.

Our core beliefs

Everything we do at *Silver Bullet* is based on three very important beliefs:

- Firstly, we believe that **creativity is not a ‘magic gift’**, with which the fortunate few - including many scientists - are born. Rather, **we believe that creativity is a skill** which can be learnt, and taught. Furthermore, like many other skills, creativity is a skill which improves with use.
- We further believe that all teaching is enriched, and is far more effective, when it is soundly based on **substantive, fundamental, principles**, rather than ‘rules of thumb’, and that good teaching is best reinforced by applying those fundamental principles to real situations.
- And we also believe - and indeed recognise - that all communities are different, and so **we tailor all our assignments** to ensure that the specific needs of each client are fully met.

Our skill enrichment and training programmes are therefore designed very much to appeal to the high intellectual calibre of research scientists, tackling creativity from a ‘first principles’ perspective, and drawing on examples from all branches of science - and many branches of the arts too. We also strongly recommend that any training or learning experience is quickly followed-up by an opportunity to apply the tools and techniques learnt to problems of direct relevance to the team.

First principles, not rules of thumb

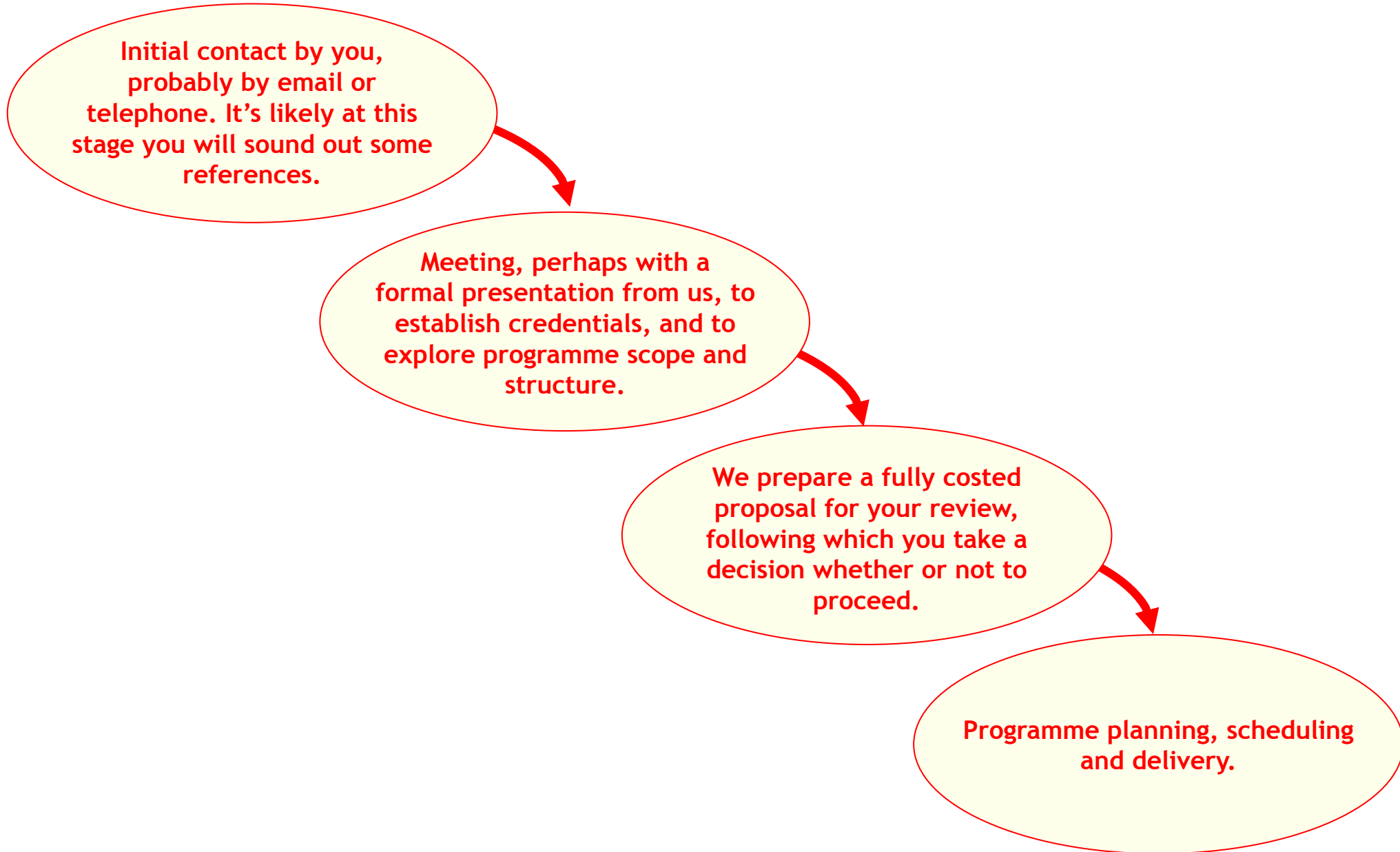
On the previous page, we referred to ‘substantive, fundamental, principles’. So let’s explain what that means...

Airport bookshops are full of volumes with titles such as “50 ways to increase your creativity” and “Ten hot tips to be more creative”. And inside you’ll find headings such as “Imagine how Attila the Hun would solve your problem” and “Think like a child”. Yes, there are indeed circumstances in which imagining what Attila the Hun might do, or where being playful, can indeed help generate ideas, so these ‘techniques’ can, and do, work. These ‘techniques’, however, are really ‘rules of thumb’, which work under some conditions but not others. And, yes, it is possible to ‘learn’ quite a few of these ‘rules of thumb’, so if it turns out that one doesn’t work in any particular context, you can try another, or another... - hence the “50 ways”.

Our approach is deeper, more fundamental. Underlying all these ‘techniques’ are some ‘first principles’. These, when understood, can be applied to every situation, and they also explain why, and when, the ‘airport book techniques’ - all of which are different special cases - work. So, at our training events - addressing the first of the EPSRC’s objectives - we don’t present a rag-bag of random processes, we don’t use fluffy toys or superfluous and unnecessary technology, we don’t get everyone to hold hands, to abseil, or to play bongo drums. Rather, we invite everyone to think, to think hard, and to challenge. What, precisely, is ‘creativity’? To what extent is creativity the individual activity of a single human mind, or the collective activity of a group? What, if any, is the difference between ‘creativity’ and other related concepts such as ‘invention’, ‘discovery’, ‘innovation’, ‘entrepreneurship’? How can we distinguish wisely between a ‘good’ idea and a ‘poor’ one - recognising that the evidence available is inevitably limited and incomplete? These are tough questions. And they each have good answers...

Creativity@home in practice

Creativity@home in practice



Creativity@home in practice

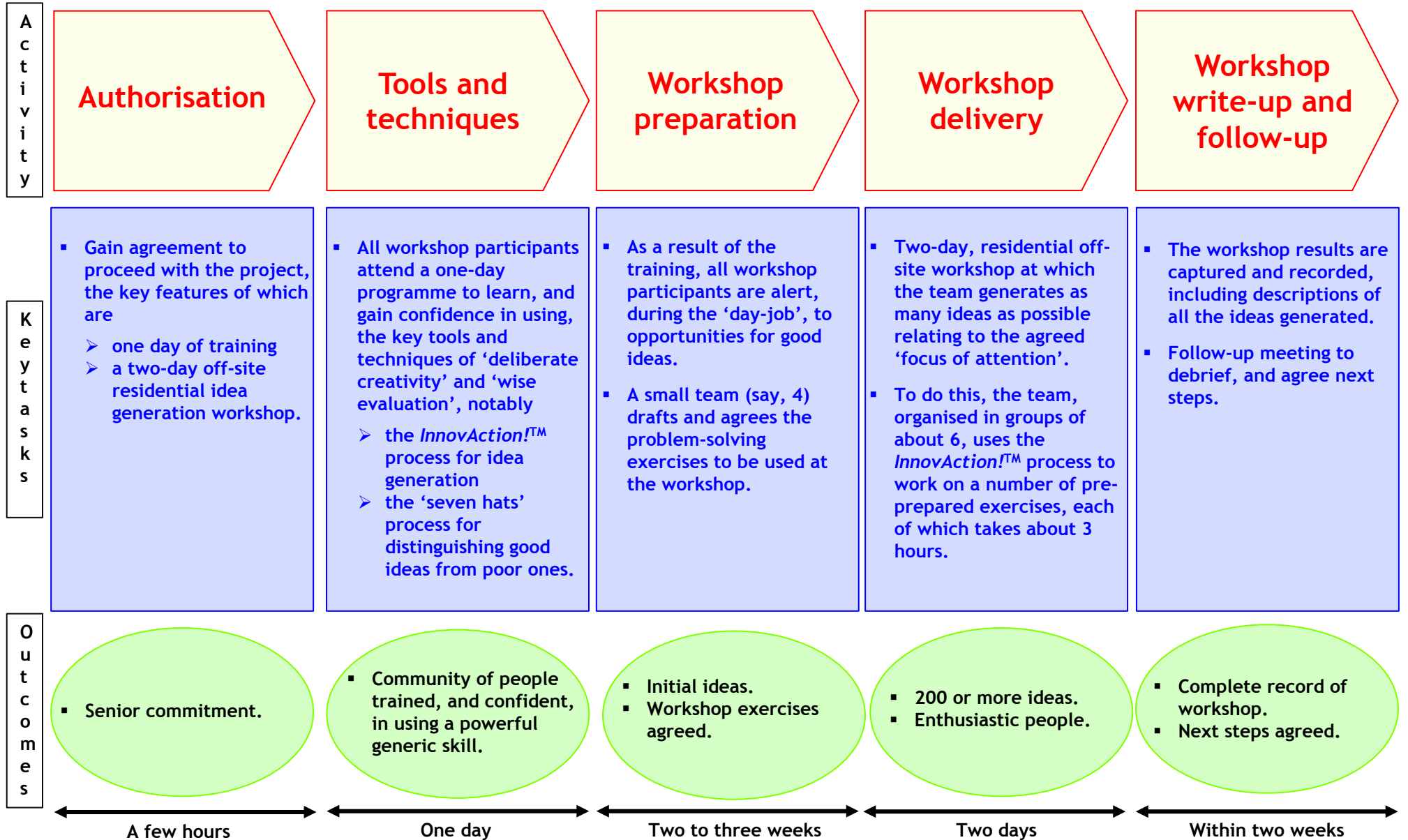
The EPSRC website* states: “*Creativity@home will typically cost circa £20,000 (80% fEC) for four days FTE for professional facilitators*”.

At *Silver Bullet*, we interpret these four days as ‘face time’ - time spent actively interacting with the research team. In addition, we put in many more days of preparation, planning and follow-up to ensure that our contribution is valuable, and well-tailored to each team’s specific requirements. We are also very flexible - we don’t have a standard programme that we roll out regardless; rather, we draw on a wealth of expertise and experience - experience gained over two decades in both the private and the public sectors, as well as with other academic teams - to craft a programme for you. To determine what that might be, the first step is to arrange a meeting to explore possibilities, and, quite often, we are asked to give a short presentation (say, 30 or 45 minutes, or even an hour) to the senior team to establish credentials. There is of course no charge for these initial discussions.

As a result of these discussions, we then put forward a proposal, defining the nature of a prospective programme, what needs to happen over what time scale, and also a formal fee quotation, including all our expenses and VAT, the total of which is necessarily within the EPSRC budget. So you may rest assured that there are no ‘surprises’ or ‘extras’. The EPSRC grant is a fee-cap - but not an arbitrary or constricting fee-cap; rather, it was determined after some pilot programmes which determined what quantum of resource was sensibly required to deliver an effective programme.

* <http://www.epsrc.ac.uk/funding/howtoapply/routes/network/ideas/creativityathome/apply/>

A typical Creativity@home programme



A typical Creativity@home programme

As we've already mentioned, we tailor our programmes to each client's specific requirements. There's a tacit assumption here that any given client knows, with some clarity, what those requirements are, requirements that can then serve as a specification against which we can design and deliver the appropriate service. This is indeed what happens in some circumstances, but certainly not all - in many situations, our clients aren't quite sure of what, precisely, they might need, nor do they have good knowledge of what might be available. So we have a lot of constructive experience in transforming a somewhat unstructured, uncertain initial context into a programme which is well-defined and valuable. It's all about dialogue.

So, if you have a specific type of programme in mind, we welcome gaining a richer understanding so we can tailor our service accordingly. But if your current thinking is rather more open, one format that we have used to great effect in many circumstances is a three-day programme (see page 10), comprising

- an initial one-day 'training' event at which we explore some tools and techniques of 'deliberate creativity' and 'wise evaluation' (see the representative agenda on page 12), so complying with the first of the EPSRC's objectives ...
- ...followed some three or four weeks later by a two-day, ideally residential, 'problem-solving workshop' (see page 13), at which the team, working in small groups, apply those tools and techniques to generate ideas relating to a number of topics directly relevant to you, your research, and your research community.

These workshops are enormously productive, and can result in 200 or more specific ideas, at all scales. So that no ideas are lost, we take considerable care to write-up all the results in a comprehensive report, which we then discuss with you at a post-workshop meeting.

An exploration of the true nature of creativity - a one-day programme

Yes, we all are creative - we wouldn't be academic researchers if we weren't.

But what, precisely, *is* creativity? Is creativity a natural gift, with which the fortunate few - like us - are blessed? Or can creativity be taught? If it can be taught, what is the process? And once an idea is on the table, how can we judge, wisely, whether it is - or is not - a 'good' one?

These are all deep questions, and this event provides an opportunity for us to explore them in detail - and maybe even enrich our own ability to have great ideas...

9:00	Coffee available
9:30	Welcome, introduction and objectives
9:45	What, precisely, are creativity and innovation?
11:00	Stretch break
11:15	Is it possible to generate stunning ideas 'on demand'?
1:00	Lunch
2:00	Group exercises
3:30	Stretch break
3:45	How to evaluate ideas wisely
4:15	How can we use these techniques in our everyday work?
5:15	Closing remarks
5:30	Close

Representative agenda for two-day problem-solving workshop

Day 1

9:00 Coffee available
9:30 Welcome, introduction and objectives
9:45 Problem-solving (1)
1:00 Lunch
1:45 Problem-solving (2)
6:00 Close of Day 1

Day 2

8:30 Coffee available
9:00 Problem-solving (3)
1:00 Lunch
1:45 Initial evaluation of ideas generated
3:30 Summary, and agreement of next steps
4:30 Close of Day 2

This a representative agenda for a two-day residential off-site workshop to generate ideas in relevant areas of interest, using the tools and techniques of deliberate creativity, as experienced at the one-day event entitled “An exploration of the true nature of creativity”, which has typically taken place 2 to 3 weeks before this event.

Idea generation takes place in a series of well-planned problem-solving sessions, in which small groups (typically, 6 to 8 people) tackle whatever issues are agreed to be important and relevant, from technical scientific issues to issues relating, for example, to team-working and the successful management of inter-disciplinary and cross-institutional collaborations. The issues examined are specific to each community, and are determined in the interval between the initial ‘exploration’ day and this event - for some representative examples of workshop ‘exercises’, see pages 35 to 41.

This event is ideally held residentially off-site, for this provides focus, some flexibility in timing, and also - and very importantly - time for team-building and for people to get to know one another better.

An absolute condition for attendance at this event is prior attendance, for the full day, at the ‘exploration’ event.

Timing, team building...

An important question concerns timing: when is the best time to gain maximum benefit from your Creativity@home grant? Some people think that this is towards the end of the current grant, so as to help discover the ‘big idea’ for the next grant. This is true. But not the whole truth. Perhaps a richer truth is to regard enhancing individual and collective creativity, throughout the entire team, as an ‘enabling technology’, helping everyone do their job better, day in, day out. Take a look at the diagram on page 21: creativity underpins the whole space, not just the ‘big idea’.

What about teamwork? Teamwork is indeed fundamentally important, for it provides the possibility for your research ‘whole’ to become greater than the sum of its ‘parts’. Although not explicitly mentioned so far, teamwork is fundamental to all our Creativity@home programmes, for one of the key messages that emerges from the discussion of the very first item on the agenda shown on page 12 - “What, precisely, are creativity and innovation?” - is that creativity and innovation are inherently ‘team sports’. So all our programmes inherently foster better teamwork, primarily by encouraging people to get to know one another better, by having many team exercises, and by creating an environment in which people listen to each other. Also, as shown by the example exercise on page 41, teamwork serves as a very rich theme for deeper discussion and exploration.

Our approach to team-building is therefore fundamental, subtle and intelligent: we don’t resort to party games, gimmicks or trivia.

...leadership, and communication

Who should attend our Creativity@home events? There is a school of thought that says something like “Senior people wouldn’t be senior people unless they were already creative. So they don’t need to participate. Creativity@home is therefore primarily an activity for PhD students and the less experienced post-docs”. This too has a grain of truth - namely, that senior people wouldn’t be senior unless they were inherently creative. But only a grain. For this statement misses two deeper truths. Firstly, that creativity can still be enhanced, even if the base line is already high (that’s the Olympic athlete analogy). And secondly, it fails to recognise that a key duty of more senior people is to *create the conditions in which others, often more junior, can flourish*. One of these conditions is ‘safety’ - how ‘safe’ is it for more junior people to suggest new, perhaps challenging, ideas? Inevitably, senior people always say “of course it’s safe”. The reality, as seen through the junior’s eyes, is often very, very different. So, if, as noted on page 14, creativity and innovation are ‘team sports’, it makes sense for the whole team to be present, including the ‘captain’.

A related topic is ‘communication’. Communication is always ‘an issue’ in every organisation: communication is never ‘good enough’, and often ranks rather lower on staff surveys than other themes. Rarely, however, is the underlying issue “I don’t receive enough emails”; rarely is the solution “let’s have a weekly newsletter”. Usually, the issues are much deeper - for example “I feel isolated”, “I am shy”, “I don’t feel I’m listened to”, “[x] doesn’t do what I want”, “I never feel [y] is telling me the whole story”, “I don’t really trust [z]”. These are tough issues, masked by “communication isn’t good enough around here”. To get to the truth is difficult, and requires real creativity - the creativity required to be truly honest, the creativity required to listen attentively, the creativity required to change one’s behaviour, the creativity required to change one’s mind.

Some references

We have very considerable experience working in the fields of organisational creativity and innovation, across all disciplines and in all sectors, and we are very pleased to give you any number of references to our work. As regards Creativity@home programmes, may we mention

- [Miles Padgett](#), Physics, Glasgow
- [Nick Higham](#), Maths, Manchester (see also [here](#))
- [David Wagg](#), Mechanical Engineering, Sheffield
- [Martin Dawson](#), Photonics, Strathclyde
- [Tim Donohoe](#), Organic Chemistry, Oxford
- [Mervyn Miles](#), Physics, Bristol
- [Omar Matar](#), Chemical Engineering, Imperial
- [Paul Dalby](#), Biochemical Engineering, UCL CDT in Emergent Macromolecular Therapies
- [Kishan Dholakia](#), Physics, St Andrews.

Other academic references include

- [Muffy Calder](#), Chief Scientific Adviser to the Scottish Government
- [Anton Muscatelli](#), The Principal, Glasgow
- [Bill Sloan](#), Environmental Engineering, Glasgow
- [Bobby Glen](#), Molecular Sciences Informatics, Cambridge
- [Stan Scott](#), Head of School, EEECS, Belfast
- [John Chapman](#), recently retired Head of the College of Science and Engineering, Glasgow.

These are all professors and PIs: we are also very happy to give you names of Post-Doctoral researchers, PhD students and project administrators, all of whom have participated in, and benefited from, our programmes.

Introducing Silver Bullet

Silver Bullet

Silver Bullet is a consulting firm, delivering services exclusively in the fields of organisational creativity and innovation. Most of our work is in these areas:

- Helping our clients **solve tough problems, or grasp key opportunities**, where the primary requirement is to generate powerful ideas. This can be very valuable when, for whatever reason, things are ‘stuck’, or where previously generated ideas have been less successful than had been hoped. Two brief examples of this are the work we did with Thames Water concerning leakage, at the time when there was the threat of a very large fine from the regulator, and the work we did with Ford, Land Rover and Jaguar when the potential sale of Jaguar Land Rover to Tata was about to fall through because of some unresolved, and seemingly unresolvable, problems with the transfer of the IT systems from Ford.
- Helping our clients design, build and implement reliable **systems and processes for ‘wise evaluation’**. Evaluating ideas wisely is often more difficult than coming up with good ideas in the first place. And this is not about preparing ‘business cases’, for so many business cases are less about evaluating ideas wisely than about discovering a set of numbers that - hopefully plausibly - show the ‘right answer’ as regards rate of return or pay-back.
- Helping our clients **design, build and implement sustainable cultures of safe and well-managed creativity and innovation** - the client’s own ‘silver bullet machine’ that can ‘make’ those oh-so-valuable ‘silver bullets’ (our metaphor, of course, for great ideas) again and again and again, whenever and wherever a great idea would be helpful.

You’ll appreciate from this description that we are not ‘trainers’, for our work is all about delivery. To deliver successfully, however, it’s usually appropriate for us to transfer our skills to our clients, so ‘training’ is something we do quite naturally, but with a bigger objective in mind.

Dennis Sherwood

Dennis Sherwood is the founder and Managing Director of *Silver Bullet*, and usually undertakes Creativity@home assignments personally. In the market place, Dennis's CV is unique. Dennis won an Open Scholarship in Natural Sciences to Clare College, Cambridge, and took firsts in Parts IA, IB and II of the Tripos. For Part 1B, he was one of only two undergraduates in his year to combine advanced physics with biochemistry; for Part II, he took experimental physics. On graduation, Dennis won a Mellon Fellowship to the Department of Molecular Biochemistry and Biophysics at Yale, and had his first research experience in the laboratory of Lubert Stryer, taking an MPhil; Dennis then moved to the Department of Biology at UCSD, where he took his PhD, using nanosecond fluorescence spectroscopy to study some dynamic properties of the lipid bilayer of erythrocyte membranes.

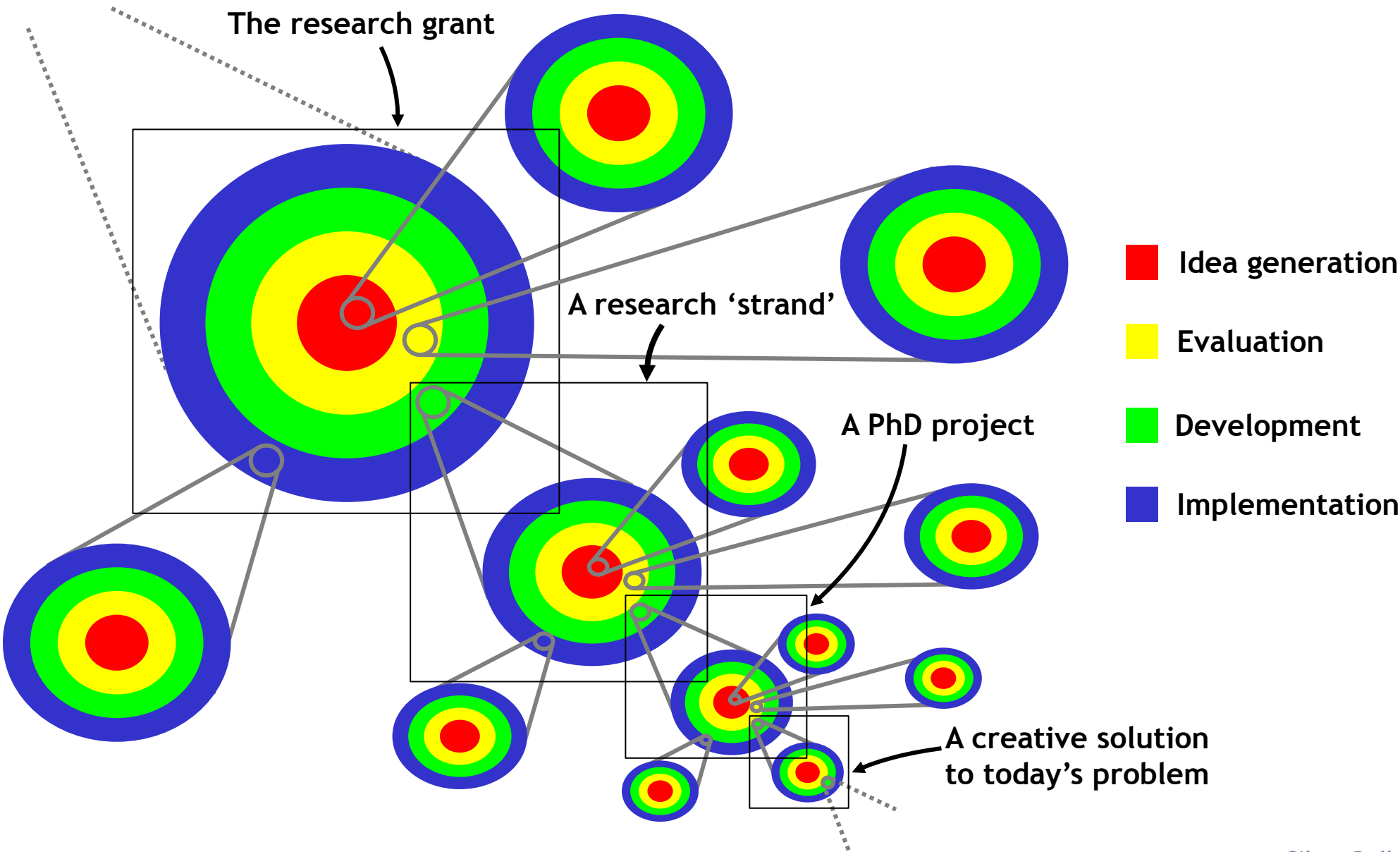
Dennis then left the academic world to become a junior in the Deloitte consulting firm, specialising in IT. After six years, at age 32, Dennis was promoted to consulting partner, a position he held for a further 12 years, playing a major role in some very large projects, such as the privatisation of the UK's water and electricity industries. Dennis then resigned his partnership to take up the position of Executive Director at Goldman Sachs, responsible for internal consulting and internal audit across Europe. Subsequently, Dennis was MD of the UK operations of SRI Consulting, after which he set up *Silver Bullet*.

Dennis is also a Sloan Fellow (with distinction) of London Business School, and has had much experience teaching, regularly participating in programmes at institutions such as LSE, London Business School and the University of St Gallen. He is the author of many articles, and nine books, written over many years, on several different subjects. He wrote his first book, *Introductory Chemical Thermodynamics* (Longman 1971) aged 19; his most recent, *Crystals, X-ray and Proteins* (OUP 2010), co-authored with UCL Professor Jon Cooper, is a second edition of a work first written by Dennis when at Yale, and published by Longman in 1975. And in-between are titles such as *Smart Things to Know about Innovation and Creativity* (Capstone Publishing, 2001) and *Seeing the Forest for the Trees - A manager's guide to applying systems thinking* (Nicholas Brealey Publishing, 2002).

As regards creativity and innovation, ***all the key content*** covered in *Silver Bullet's* training programmes, and all the tools and techniques used in our assignments, are Dennis's own IP: they are not just re-hashes of Edward de Bono, Alex Osborne or the latest airport book - Dennis invented them. And they work.

Our key principles

Innovation works at all scales

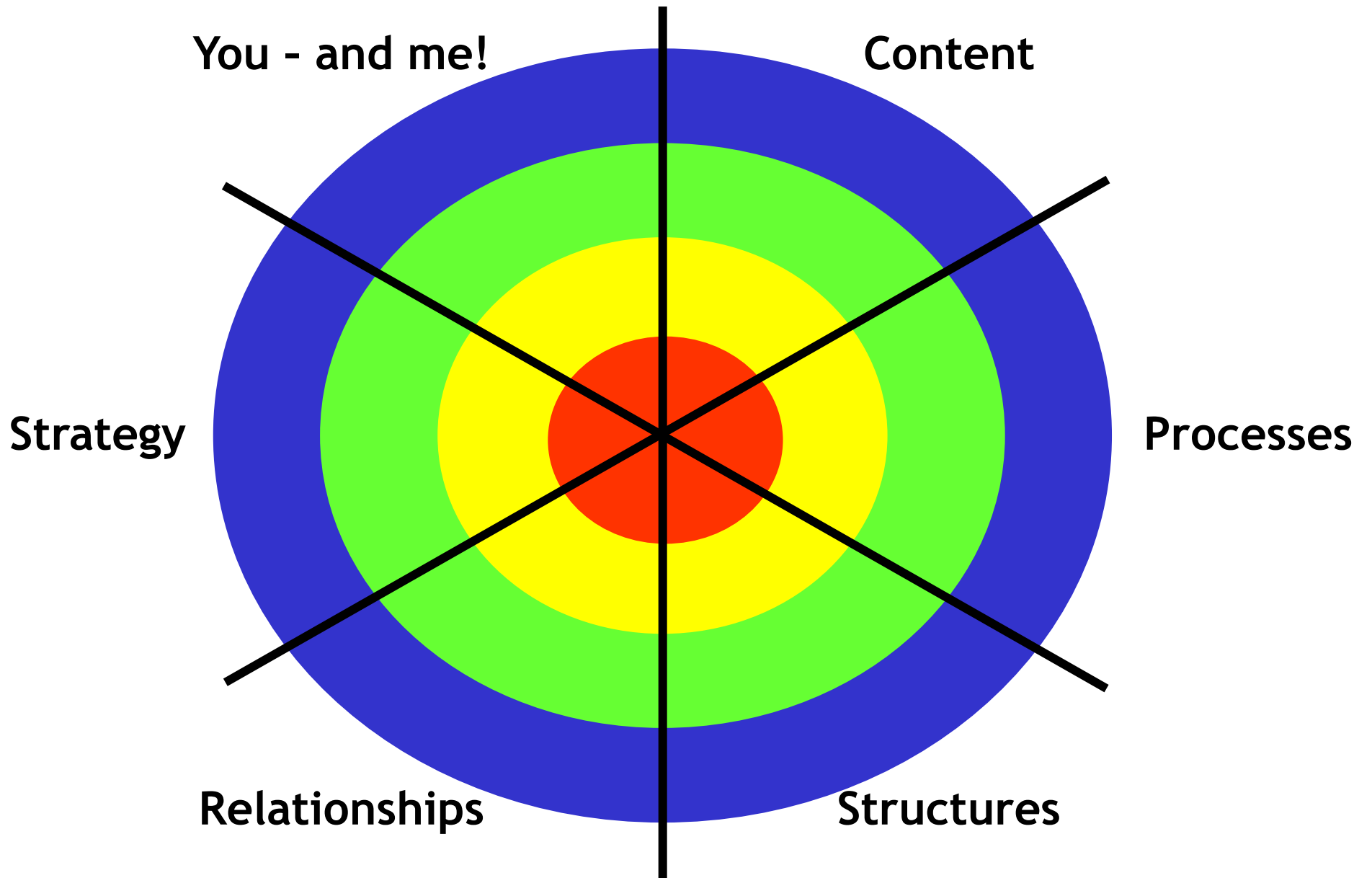


Principle 1 - the ‘target diagram’

At *Silver Bullet*, we distinguish between ‘creativity’ (having ideas), and ‘innovation’ (making an idea real). And its ‘innovation’ that counts, for until an idea has been realised, it can’t have any impact. But you have to have the idea first. Having ideas, being creative, necessarily underpins innovation, but having an idea does not imply that successful innovation will necessarily follow: once an idea has been generated, it needs to be evaluated as ‘good’ or ‘bad’, for only the ‘good’ ideas warrant the time and resources required to develop them, to make them fit-for-purpose, to solve all the detailed problems. Only then can the now-fully-developed idea be implemented.

We represent this four-stage process by the ‘target diagram’, which, as shown towards the top left of the illustration on page 21, could represent, for example, a research grant. The basis of the grant is the ‘big idea’ (the red zone), which was evaluated (firstly by you and your team, and then by the EPSRC) as being ‘good’. Much of the activity of the team is within the green ‘development’ zone, with ‘implementation’ being represented by conference presentations, published papers and possibly patents or spin-outs.

Importantly, this four-stage process of idea generation, wise evaluation, well-focused development, and successful implementation, is embedded within itself, at all scales - the process is a fractal. So, this process can be used, at ‘small scale’, for example, to find a creative solution to ‘today’s niggling problem’; the same process, operating on a much larger scale, can also be used to identify the theme of the next big grant application.



Principle 2 - not just ‘the better mousetrap’

Many people associate creativity and innovation with the discovery of ‘the better mousetrap’ - the invention of some blockbusting new consumer product, or, in a scientific context, the discovery of a great breakthrough, such as relativity or the structure of DNA.

Yes, creativity and innovation can indeed apply to the **content** of what we do, but as the diagram on page 23 illustrates, that’s not the whole picture. In addition, creativity and innovation apply to

- the **processes** we use to deliver our content (such as the PhD process)
- the **structures** within which we do what we do (for example, the departmental structures within a given university)
- the **relationships** we have (such as with industrial partners)
- our overarching **strategy** (the ‘big picture’), and, importantly
- **‘you - and me!’** - this being a reminder about the assumptions we all make without recognising we are making them, and the beliefs and prejudices we all carry around, these collectively forming probably the most important ‘box’ we need to ‘get out of’.

Yes, creativity and innovation are important as regards the ‘hard science’ of what you do. But maybe the most powerful innovation is not in the scientific domain at all - perhaps its about building a higher-performing scientific team, and truly making the ‘whole’ greater than the sum of its ‘parts’, maybe its about how to make a collaboration work better, about how to achieve greater impact, or about how to become an even stronger ‘magnet’ for talent...

***The creative act is not an act of creation
in the sense of the Old Testament.***

***It does not create something out of
nothing; it uncovers, selects, re-shuffles,
combines, synthesises already existing
facts, ideas, faculties, skills.***

***The more familiar the parts, the more
striking the new whole.***

Arthur Koestler, *The Act of Creation* (1964)

Principle 3 - 'Koestler's Law'

Arthur Koestler's insight that the act of creation is not a 'bolt from the blue', but rather a process of pattern formation, is an important principle for three reasons:

- Firstly, it implies that **you don't have to be 'special' to be creative**. In fact, the very opposite is the case: all human beings have the power to generate great ideas, for we can all assemble patterns from existing elements. That's what children do with *Lego* bricks. And pattern formation and recognition is something the human brain is very good at. So this debunks the myth of the 'creative person'.
- Secondly, **it hints at a process for making creativity happen** - a process which is about gathering together existing facts and ideas, and seeing what might happen if they are brought into juxtaposition.
- Thirdly, it suggests that **the 'playing field' is a lot more level** than we might think. 'Koestler's Law', implies that, in, say, three years' time, when the next major paper in your field is published, it will be possible to 'deconstruct' that great idea into its component parts - parts *which are likely to exist right now**. So the challenge, and indeed the opportunity, is for you and your team to identify the right component parts, and bring them together into an appropriate pattern, first.

* A historical example of this is what *didn't* happen as regards the discovery of the structure of DNA - but might have done. We all know the story of the double helix and Watson and Crick, as published in their famous *Nature* article of 25th April 1953. But let's remember that, in 1950, Erwin Chargaff had published the vital result that A(denine)=T(hymine) and C(ytosine)=G(uanine), overturning the previous belief that A=T=C=G. Chargaff's discovery implied that the structure of DNA could not be based on A-T-C-G tetramers, but must be formed from A-T and C-G dimers. At that point, anyone who knew the chemistry of A, T, C and G could have hypothesised the 'ladder' nature of DNA, how DNA might 'unzip' and replicate, as well as the basis of the genetic code. The double helix is interesting; the A-T, C-G dimer structure is fundamental.

This musical score page, numbered 11, features ten staves of woodwind instruments. The instruments and their parts are:

- Fl. picc. (Piccolo Flute):** Two staves (1 and 2) with melodic lines and slurs.
- Fl. gr. (Great Flute):** Two staves (1 and 2) with rhythmic patterns, including a 7-measure rest.
- Fl. in Sol (Flute in Sol):** Two staves (1 and 2) with melodic lines and slurs.
- Oboi (Oboes):** Two staves (1 and 2, 3) with rhythmic patterns and slurs.
- Cor. ingl. (English Horn):** One staff with melodic lines and slurs.
- Clar. picc. (Piccolo Clarinet):** One staff with melodic lines and slurs.
- Clar. 1. (La) (Clarinet 1 in B-flat):** One staff with melodic lines and slurs.
- Clar. (Sib) (Clarinet in B-flat):** Two staves (2 and 3) with rhythmic patterns and slurs.

The score includes various musical notations such as slurs, accents, and dynamic markings like *mf*. A specific instruction *Flatterzungen* is written above the second staff of the Fl. in Sol part.

Principles 4 and 5 - emergence, and ‘unlearning’

‘Koestler’s Law’ implies that creativity is the formation of a new pattern from pre-existing elements, where the ‘novelty’ is at the level of the resulting pattern, rather than at the level of the component parts from which that pattern is made. The most immediate example is music: neither Beethoven nor the Beatles invented the notes, but they did form some memorable patterns. But the example of music also highlights something missing from Koestler: the self-evident fact some patterns are ‘better’ than others. So although Koestler’s Law implies that any new pattern is a manifestation of creativity, what we seek is not just any-old pattern, but those specific patterns that are ‘better’, that have ‘beauty’, or - in a scientific context - explanatory or predictive power. So our search is for those ‘special’ patterns that show emergence - that’s principle 4.

The explanation of the fifth principle, ‘unlearning’, merits many pages in its own right. But very briefly, imagine that a 55-year-old wants to improve his golf swing. He has two problems to solve - the easy one being to learn a new swing, the hard one being to ‘unlearn’ the old one. ‘Unlearning’ is the (usually necessary) requirement to be willing to ‘throw away’ the old idea, so as to ‘make room’ for the new one. ‘Unlearning’ is therefore a prerequisite for allowing creativity to happen, and - for many people - ‘unlearning’ is very difficult indeed. Especially for those who are ‘in love’ with their own ideas, or feel threatened by new ones. So much of our training focuses on how to help people feel ‘safe’ about ‘unlearning’.

This also explains the “50 ways to increase your creativity” books: each of the 50 ways (and many others too) are just special cases of the application of Koestler’s Law, emergence and unlearning: Koestler’s Law, emergence and unlearning are the true ‘first principles’.

*InnovAction!*TM

- **Step 1 - Select the appropriate focus of attention**
- **Step 2 - Define what you know**
- **Step 3 - Share**
- **Step 4 - Ask “How might this be different?”**
- **Step 5 - Let it be...**
- **Step 6 - ...Then repeat steps 4 and 5 for another feature...**

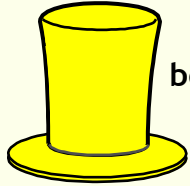
Principle 6 - *InnovAction!*TM

*InnovAction!*TM is *Silver Bullet's* proprietary process for making creativity deliberate, systematic and safe. Unlike conventional 'brainstorming' - which starts with an actual, or metaphorical, 'blank sheet of paper' - *InnovAction!*TM starts in a very different place, and with a very full 'sheet of paper' indeed: the 'sheet of paper' defining what we, individually and collectively, know about a given 'focus of attention'. The 'focus of attention' is just that - the domain in which the team is seeking new ideas, in whichever segment of the 'target diagram' is of current interest. And very often, the 'focus of attention' is expressed as a question, such as "how can we re-invent catalysis?" or "how can we be more effective in running our research programme across multiple sites?". Members of the team know a lot about catalysis (or whatever), and a lot about what is happening in the project right now across the different sites. So the starting point of *InnovAction!*TM is to define that reality, and articulate it clearly to one another. And when we do that, we often find, for example, that what our project 'looks like' from one person's perspective is very different from another's - and many of the problems lie in those different perceptions...

This basis of reality then gives the team a springboard for asking the central question "**how might [this] be different?**" - for what we are usually searching for is not *novelty* but *difference*. This question 'forces' difference, and in so doing 'operationalises' Koestler's Law, for the result is inevitably "a new pattern of pre-existing elements".

Our training programme builds people's confidence in using *InnovAction!*TM, and our problem-solving workshops use it to generate many ideas of direct relevance to the team. And most importantly, our involvement equips people with a new, fundamental, generic skill - the skill to tackle unknown, difficult, problems in a disciplined and systematic way.

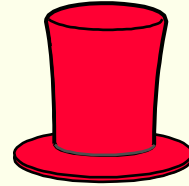
How to evaluate ideas wisely



What are the benefits of this idea?
Who are the beneficiaries?



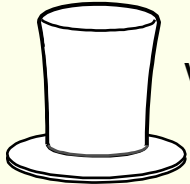
What issues need to be managed to make this idea successful?



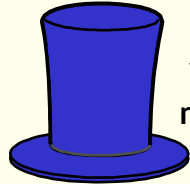
How will people feel about this idea?



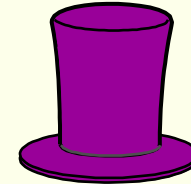
What ideas can we generate to solve the problems identified by the other hats?



What data do we need?



What else do we need to consider?



What next?
What's the plan?

No idea is born with a business case attached.

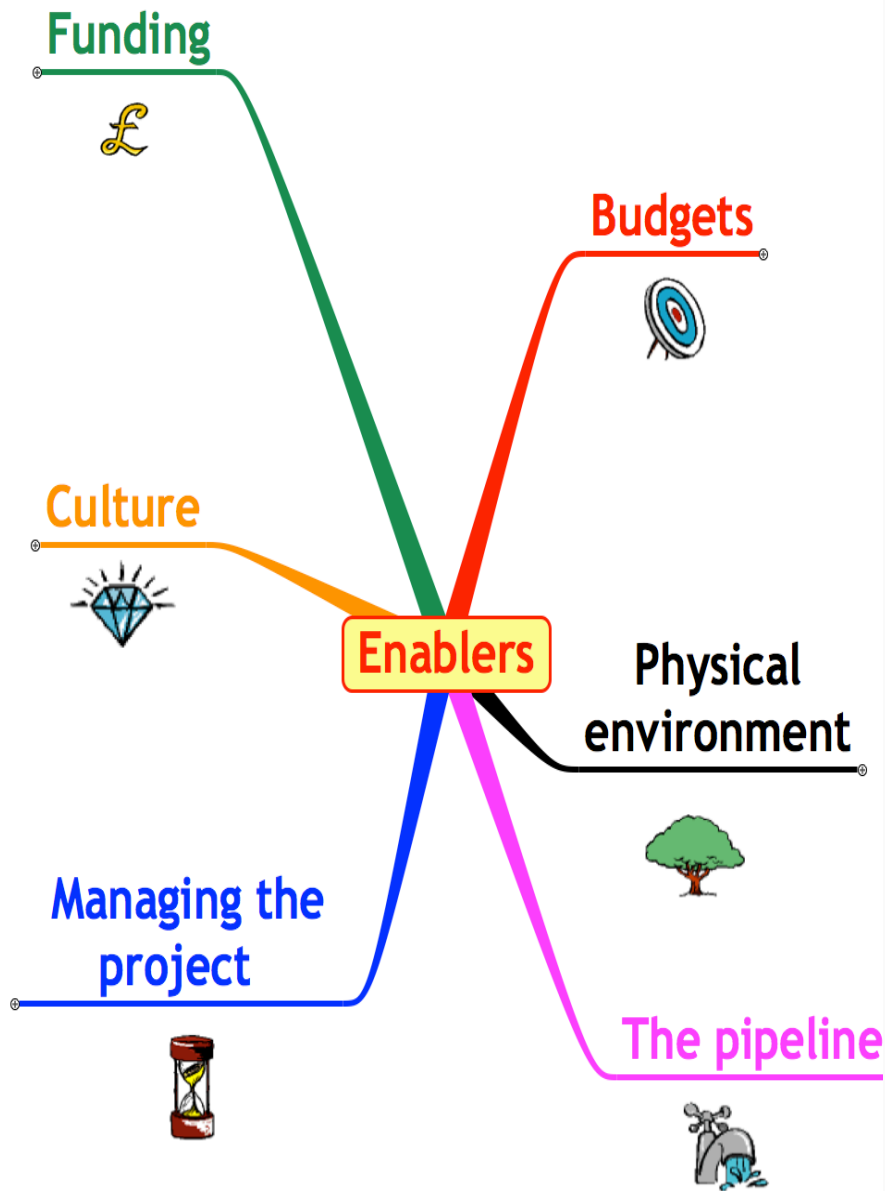
To evaluate an idea wisely, ask these questions, which are based on Edward de Bono's *Six Thinking Hats*.

Principle 7 - Wise evaluation

How can you distinguish wisely between good ideas and poor ones?

Sometimes it's self-evident - the idea explains the data, or binds together previously apparently unrelated observations. But sometimes it's not so self-evident, especially as we progress, clock-wise, around the 'target' diagram. Suppose, for example, that the Vice-Chancellor of your university announces a merger with a neighbouring university - is that self-evidently a good idea? Or, perhaps closer to home, imagine the reaction to the suggestion "to help build our team, wouldn't it be a good idea for Professor A on campus A, and Professor B on campus B, mutually to re-locate for six months to each other's campuses?".

When ideas are tabled, it's very easy to confuse "I like that idea" - or even "I like the person who suggested that idea" - with "it's a good idea" (and of course the converse). Removing the emotional response to ideas is very difficult, especially if the idea has a personal impact. To help address that difficulty, we recommend a disciplined and rigorous process, themed around the seven questions shown on page 31.



Principle 7 - Building the culture

Successful innovation, in any field, is very difficult for an individual, and even for a small team, to do on their own. Most individuals and teams exist within a wider organisational context, so, sooner or later, other parts of the organisation necessarily become involved, perhaps to authorise budgets, perhaps to commit resources, perhaps to assess the risk.

Universities, certainly, are very different from corporations in this regard, but it is very unusual, even in academia, for any one 'man to be an island'. As soon as we need to interact with other people beyond our immediate, local, community (and even within it), we become aware of other people's behaviours, assumptions, prejudices, priorities - just as other people become aware of our own behaviours, assumptions, prejudices and priorities. Organisationally, this works acceptably if these are all more-or-less aligned, and if we are all playing to more-or-less the same set of 'organisational rules'. But if people aren't playing to the same set of rules, things can become dysfunctional indeed.

An umbrella term for all this is the organisational 'culture', implying that, if an organisation wishes to become sustainably innovative, then this usually requires some form of culture enhancement, enrichment or change. This is alluded to in the EPSRC's fourth objective ("...so that the approaches become embedded in the group, department, institution"), but in our experience, actually achieving this is beyond the scope of a typical Creativity@home programme. We are, however, expert in this field, so if it is of interest, we would be very pleased to explore how this might take place - which, very often, is about working with some or all of the 'motivators' and 'enablers' shown on page 33, which, individually and collectively, influence very strongly the overall organisational culture.

*Some representative problem-solving
workshop exercises*

Some representative problem-solving workshop exercises

Once the fundamental principles of creativity and innovation - the 'target' diagram, Koestler's Law, *InnovAction!*TM, and so on - have been explained, it's very important to consolidate the corresponding learning by putting the tools and techniques to use on problems of direct interest and relevance to the team.

A powerful way of doing this is to convene a problem-solving workshop - ideally held residentially over two days - at which the team works in small groups (typically 6 to 8) on carefully prepared 'exercises', each relating to a specific 'focus of attention'. A well-crafted exercise typically requires 3 or 4 hours to do well, so, over two days, a team of 18, doing different exercises in parallel, is likely to explore around 9 exercises.

Some representative examples of workshop exercises are shown on pages 37 to 41, and, as you will see, they conform to a particular style, which is explained during the first training day. We stress that these are just examples, to give you a sense of what an exercise typically 'looks like' - the exercises used at your workshop will be about your science and your context: indeed, much of the value of our contribution is to work with you, in the interval between the training day and the workshop, to draft and refine a good set of exercises that are specifically and directly relevant and useful to you and your team.

The exercises are usually very productive - it's not unusual for 200 or more ideas, of all scales, to be generated at the problem-solving workshop. To ensure that none of these ideas are lost, we take considerable care to capture all the workshop's results in a comprehensive report.

Re-inventing the [whatever]

Much of our work makes use of a [whatever].
Here is an opportunity to re-invent this very familiar instrument...

Individually and in silence, describe in as much detail as you can...

- what a [whatever] looks like, how it is constructed, and what it fundamentally does
- how a [whatever] works
- the nature of the signal we measure
- what we use the instrument for
- the fundamental science underpinning its operation
- the constraints under which it operates
- ...

When everyone is ready, share, and compile what will certainly be a long list of features.

Then, stand back, and identify some 'interesting' features, and ask "how might this be different?" - and identify as many possible alternatives (however crazy!) as you can.

What ideas does this generate for a radically new type of [whatever] ?

[This] branch of science

Individually and in silence, describe, in as much detail as you can...

- **what we currently know about [this]...**
- **...and what we don't know, but would like to**
- **the equipment we currently use...**
- **...and how we use it**
- **the fundamental science underpinning [this]...**
- **...and the assumptions we naturally make**
- **the types of research question we currently ask**
- **...**

When everyone has finished, share your thoughts with each other. Is there a natural consensus on some points? Is there variety?

Then ask “how might this be different?” of each feature, and let it be...

What ideas does this generate which would enrich our research?

The bequest

From Nature, 3rd April 2014

Tenders are invited for a lump sum of £50,000,000, from a private bequest, for the creation of a new Institute of [whatever]. The key criterion by which the tenders will be judged is that the approach must be truly novel, in that what the Institute does, and how it does it, must be genuinely, and demonstrably, innovative, and substantially different from any existing, comparable institution.

Your task is to formulate our entry...

To help you do this, individually and in silence, identify the institutions that you would regard as the current role models for [whatever], and, for each, compile a list of what they do, and how they do it.

When everyone has finished, share your individual thoughts with each other. This provides you with the springboard to ask “how might this be different?” of the various features of institutions that currently exist, so helping you generate ideas for our entry.

What ideas does this generate for new research themes?

Making collaborations work better

Working individually and in silence, describe, in as much detail as you can, how some recent collaborations have *actually* worked, exploring for example:

- the nature of the collaboration (within one institution, cross-institution, with an industrial partner...)
- the key objectives of the collaboration (how it was intended that the collaboration would achieve more than could be achieved within your own team...)
- how the collaboration partner (or partners) was (were) identified (why partner 'X', rather than 'Y'...)
- how the nature of the collaboration was defined (who did what...)
- how the collaboration was organised (roles, structures, authorities, decision-making...)
- how the collaboration was planned (tasks, milestones, deadlines, deliverables...)
- how the collaboration was managed day-to-day (reporting, communication, meetings...)
- how any conflicts arose, and were resolved
- the extent to which the originally intended objectives were successfully met
- those features of the collaboration that worked well...
- ...and those that worked less well.

Then share, and, as a team, explore what could beneficially be different.
What ideas does this generate?

What would you recommend as regards how to make collaborations work more effectively in the future?

Building high-performing teams

What, precisely, is a team?

Working individually and in silence, make some notes on...

- the key characteristics you consider to be the essence of a high-performing team
- the key differences between n people behaving as a sustained high-performing team, and those same n people just 'doing their own thing'
- some specific examples - drawing on your own direct or indirect experience - of teams, with both a successful, and perhaps a not-so-successful, outcome
- the factors that you think underpinned the success (or indeed otherwise) of the team.

When everyone has finished, share your thoughts with each other. Is there a natural consensus on some points? Is there variety? What ideas does this generate as to how teams can become more effective?

As a team, prepare a 15-minute presentation entitled "How to build high-performing scientific teams".

In conclusion

How *Silver Bullet* adds value

As a specialist consultancy focused exclusively on organisational creativity and innovation, we are small, and we do not operate by selling our clients bright, young, energetic - but also inexperienced - consultants.

Rather, our added-value is attributable to:-

- **Our willingness to share our knowledge, and transfer it to you.** Our knowledge has been built up over many years, and our approach to innovation is - truly - unique. We did not learn it from others, nor at a business school, nor from books - we invented it. Certainly, we acknowledge the work of others such as Arthur Koestler, Edward de Bono and Arthur VanGundy (to name just three); what we have done is to build on their work, adding to it our extensive experience of the realities of organisational life, so creating genuinely novel processes - processes which everyone in your team can learn and use.
- **Our knowledge of, and empathy with, scientific research.** As we have already mentioned, we have successfully completed many assignments with academic teams. We understand the pressures and the contexts, the challenges and the opportunities.
- **Our extensive experience of organisations, managing and change.** We have extensive experience, gained both from consulting and line management, of many aspects of organisational endeavour, in many sectors, both public and private. We have orchestrated, managed and led large and small projects; we know what works, and what doesn't; and we understand that what works and what doesn't is not absolute, but is sensitive to context.

Next steps

Thanks for reading this far!

We trust you have found it succinct and thought-provoking.

If this captures your imagination, please contact Dennis at:

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Idea generation,
evaluation and
development

Silver Bullet

Making innovation
happen

Strategy development
and scenario planning

The Silver Bullet Machine Manufacturing Company Limited

Innovation, Innovation, Innovation

Building
high-performing
teams

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knowledge transfer

Conferences

Systems thinking,
and business and
market modelling