Mistaken identity or multiple identities? A case for multiple frames

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Abstract

This paper explores the merits and practicalities of using a multi-framing approach in problem solving and decision making, through applying it to a real situation. We provide a rationale for the multi-framing approach, which is founded on the notions that there is no one correct way to approach most real problems, and that single-frame approaches can induce frame blindness.

The case analysis demonstrates benefits of multi-framing that include building frame awareness, overcoming frame blindness, and understanding the development of perspectives that contribute to more robust and acceptable 'solutions'. We describe our experiences of using framing as a meta-framework for problem solving and illustrate how the approach may be used in the classroom. In doing so, we indicate how the nature and success of problem-solving interventions can be frame dependent.

1 Introduction

This paper explores the merits and practicalities of using a multi-framing approach in problem solving and decision making, prompted by our consulting and teaching experiences, together with recent research on multi-framing [2]. The rationale for developing such an approach has evolved over time, and stems from the following observations:

- There is no one correct way to solve most real problems, and the choice of frame of 'best fit' is usually influenced heavily by the analyst's background.
- Single-frame approaches often suffer from frame blindness, with a danger of overlooking significant factors in problematic situations.
- Multi-methodologies have offered a way forward for problems where a single methodology is inadequate on its own, so perhaps multi-framing can offer advantages by seeking to overcome frame blindness resulting from single frames.

The first premise, that there is no one correct way to solve most real (as opposed to text book) problems, is based on experience gained both in practice and in teaching. Most real problems involve many issues that could be approached by more than one method. It is thus rather problematic for teachers when asked, as we frequently are at the end of a course on Operations Research or other decision-making tools, "How do I know what method I should use in a particular situation?" While it is possible to construct tables to guide users to the appropriate tool for the characteristics evident in the problem - and indeed we have constructed such tables for this purpose – there are often too many

characteristics in a problem to make the choice clear-cut. We could opt for the one characteristic that seems most constraining, but do we know in advance what that is? In most situations there will be more than one valid method to use, each dealing with a subset of issues in the problem. If this is so, then this leads to the second issue:

That the single-frame approach will often address only part of the problem. This leaves part of the problem unresolved. But it is hard, once we've 'solved' the problem one way, to stand back and use other frames. We tend to become what Russo and Schoemaker[9] term "frame blind". Having 'solved' a problem, we pride ourselves on having found the 'correct frame'. But our first frame often totally ignores critical aspects of the problem. It is as if in our rush to frame the problem, we overlook, consciously or subconsciously, evidence that might disconfirm our initial choice of frame. Speaking from personal experience, when I have subsequently looked at the problem from a different angle I have been surprised to see that some of these hitherto-overlooked features have a much more important bearing on the issue than I had imagined. Moreover, in considering the problem from another angle, taking account of these features, new options for dealing with the problem have been surfaced.

The paper contends that there is advantage in using more than one frame to address most problems, and that our solutions would be more robust if we applied multiple frames more routinely. We describe the method, which we term multi-framing, by applying it to a mini-case based on a real situation.

Of course the multi-framing approach can in itself be accused of being a meta-frame of best fit, and we hasten to add that while this method has been useful to us in exploring real problems, we make no claim of its superiority – its success will depend on the choice of individual frames and the willingness of problem solvers to think 'outside the box' and look for disconfirming evidence.

The following case is based on a situation that arose a couple of years ago when one of the authors was involved in putting in a bid for a project. For confidentiality reasons the details have been altered or omitted, but it is also true to say that we suffered from a lack of hard information that is probably typical of any project at start-up.

1.1 Caselet: An Ethical Dilemma?

> Your company has just received a highly confidential request for proposal (RFP) for a job that involves some "market research", the results of which will be used to revamp a public programme. The job is urgent, with only 2 weeks to complete the tender proposal, and once the tender has been selected, the successful tenderer will have a very short time to complete the project.
>
> Your boss, Dick Burdonhand, is very keen for you to put in a tender, because the company could do with the business – to put it mildly. Times have been tough lately, and the company is desperate to get more business.
>
> However, Sarah Toogood, one of your team, has expressed disquiet about the nature of the work. She thinks it goes against her ethics, though has had difficulty explaining exactly what it is that bothers her. She suspects that the results of the research will be used to disadvantage a wide group of the public, who are relatively helpless against the monopolistic organisation commissioning the research. Sarah has indicated that she wants no part in the project, but if she

does opt out, you will still need someone with her skills, and such a person may not be easy to find at short notice.

Your team doesn't know whether the project can be successfully completed in the time available. They certainly have the skills to do part of the job but could not manage the whole job without Sarah or someone else with her skills. Your team is concerned that there is a very high degree of consultation required in the project for it to be seen to be valid, yet the time allowed seems too short to do that properly. Without it, the project's results are unlikely to be accepted by the public. If they are not accepted, then there is likely to be a public outcry, and your own company is likely to suffer damage to its reputation – which in the long run is sure to damage business.

So there appear to be several questions to answer: should your company put in a bid for the work? Should you let Sarah follow her instincts and opt out of the project, or should you try to talk her into taking part? Should you follow Sarah's instincts and drop the job altogether? Or should you follow your boss' directive, and put in a proposal? After all, without the business, there's no guarantee of future work, and you may well be out of a job anyway. If you do put in a proposal, are there any particular guiding principles that would be useful in putting it together?

What should you do?

We will now frame the problem in several ways, providing insights into the problem, and observing, "What aspects does each frame highlight and what does it shadow? What actions are likely to be taken in each of the frames?"

2. Analysis

2.1 Metaphoric Frames

The first tool we could use in trying to understand the issue is a frame analysis along the lines of that devised by Russo and Schoemaker [2]. Their worksheet helps us identify crucial aspects of a frame, such as the frame's boundaries, yardsticks and reference points. Often such frames can be encapsulated in a metaphor, motto or saying. We can use this approach to analyse the two opposing views apparent in the case.

Dick Burdonhand, as his name suggests, can be summed up by the saying, "A bird in the hand is worth two in the bush." This captures his focus on the short-term business imperative of bringing in some cash: his main yardstick will be cash in, his reference point will be breakeven or survival in the short-term, and he doesn't appear to concern himself with the ethical or longer-term views. He will want to put in a proposal at an attractive price.

Sarah Toogood, on the other hand, considers the potential impacts of the job, the public good; these will influence her yardsticks: eg. level of public support for the company, with its reference point being the current level of public support. She appears to be less concerned with the survival issue, though that may just be her limited view. She also seems concerned about the longer-term company reputation, though whether this is driving her position is debatable. Her metaphor or saying could be "Miss Goody Two-Shoes," or "Fools rush in where angels fear to tread."

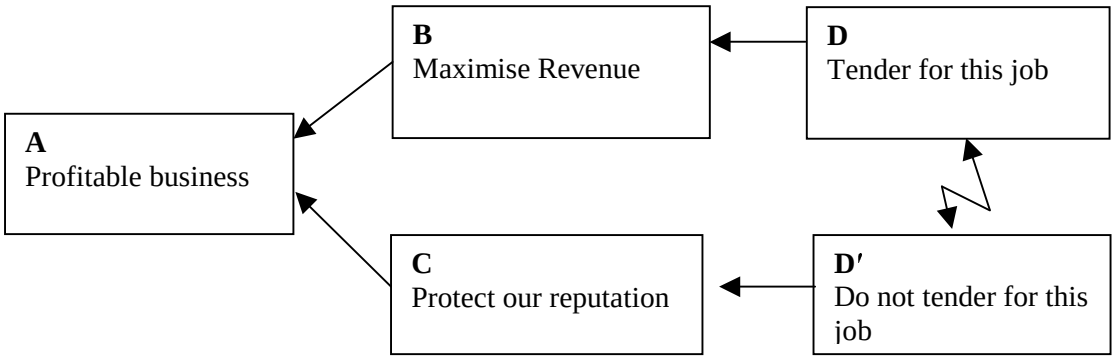
This analysis highlights the differences between the two opposing views and suggests that they are the logical result of the different boundaries, yardsticks, and reference points. While the frame analysis aids better understanding of each individual's perspective, it shadows or downplays the existence of a common goal, and provides limited scope for consensus or 'win-win' solutions.

Likely outcomes under this frame are compromise or 'win-lose' solutions. Rules and guidelines would be developed to avoid future problems of this nature. In contrast, the next frame has as one of its premises that a 'win-win' solution is possible desirable.

2.2 Evaporating Cloud

The second frame we will use for this dilemma is an Evaporating Cloud [5], also known as a conflict resolution diagram [3], which focuses on this question of "To tender or not?" seeking a win-win outcome. To use the cloud frame, first the cloud is constructed, in this case stating the two opposite actions in the right hand boxes. In the middle boxes, we put the needs that those actions are trying to satisfy, and in the left hand box we put a common objective that both sides are trying to achieve.

There are a variety of clouds possible, but an example cloud might be stated as:



> We read this cloud as follows:
> Our objective is to have a Profitable business, and in order to achieve this, we must Maximise revenue. In order to Maximise Revenue, we must Tender for this job.
> On the other hand, in order to have a Profitable business, we must Protect our reputation, and in order to achieve this, we must Not tender for this job. Hence the conflict!

If Protecting Reputation is seen as protecting long-term revenue, and Maximising Revenue represents a short-term focus, then this can be viewed as a Short-term vs Long-term tension. Alternatively Reputation could be expressed as Avoid Public Outcry, etc… the words in the boxes may be stated in many ways.

Usually the next step is to surface the assumptions which underlie the arrows. These can be read: "In order to have ***A*** we must have ***B*** because ***Assumption***." Then an idea for breaking one of the arrows by falsifying the assumption is found (Injection). Alternatively one might ask directly, "How can we have B without D or C without D′?" so that we can have B AND C and thus break the dilemma. A popular way of breaking this particular dilemma, is to seek extra time, which breaks the connection "In order to

Protect our reputation we must not tender" because if we get extra time, project quality could be upheld, a public outcry could be avoided, and our reputation would be preserved. Another approach is to submit a relatively high tender price, which signals the company is less enthusiastic about this sort of work due to the inherent traps, without being seen to be high-minded (which might jeopardise future jobs).

Other possible solutions that have arisen from using this frame, are to negotiate a confidentiality clause to prevent our company being associated with the work publicly, thereby protecting our reputation. Alternatively we might suggest adding resources so it CAN be done in time.

This conflict cloud frame represents the situation as a one-off conflict, arising from two opposing wants, each one a logical result of the two parties' different needs, but it also posits that there is a common goal and that there exists a win-win solution. The two needs can often be thought of as criteria for success as in the Russo and Shoemaker frames, and it may be that there are multiple needs, which may lead to the notion of multiple criteria for an MCDA model.

The cloud is intended to generate breakthrough ideas, without regard for practicality or effectiveness, so these issues are downplayed by this frame. While the cloud is very useful for devising a way of breaking the conflict, it does not look for consequences or side effects (though other Theory of Constraint tools are designed to address these concerns – see below).

Using the cloud, the decision maker is prompted to suggest a way of meeting both sides' needs, eg protecting the company's reputation AND maximising revenue, for example by asking for more time so that the project can adequately address the social concerns through sufficient consultation. The cloud tends to consider just the two sides on this particular issue, and not the wider company or society issues. If the problem is merely a symptom of a more chronic conflict, then Goldratt recommends the use of other TOC tools in tandem with the Evaporating Cloud (see 2.8 below).

The cloud tends to overlook the uncertainty surrounding what might happen following the tendering process. This will be the focus of the next frame.

2.3 Decision Analysis

Since there is a sequence of decisions to be made, (to tender or not? Will Sarah stay or leave? Will there be a public outcry? …) and since following each decision there are a number of possible outcomes, it would be natural to consider framing this problem as a decision tree. Even with such sketchy information, it is possible to structure the decision as a sequence of decisions and chance events, using some guesstimates for probabilities and payoffs. We are not restricted to use only Expected Value: there are other criteria like minimax, etc, or maximum likelihood, that could be used, and ideally one would show the risk profile table [10, Ch 3] of the favoured option.

Even without firm data, new insights arise from the realisation that there is a sequence of decision options and interdependent chance events, such as that the probability that the most optimistic path will eventuate is low, the chances of failure are high, and the expected payoff of bidding is low. If a bid is to lead to success, there is going to be some call for damage control or risk management. If one could bid at a high price while improving the chances of success (eg by seeking an extension of project time), this

would improve the expected payoff. Hence a recommendation would be that one bids high and seeks more time. This choice will depend on the assumptions made along the way, and on the decision criterion chosen. While sensitivity analysis to data assumptions is highlighted as an essential part of the decision analysis approach, such analysis may not question alternative structures of the tree itself. The decision analysis frame also shadows personal views, intuition, opposing views, measures other than payoffs and risks, and assumes everyone will agree to the 'best' solution.

The decision analysis also downplays the fact that the probability of success of the tender will be negatively correlated with tender price (though this could be included explicitly in the decision tree). It downplays the fact that bidding high is counter to what Dick Burdonhand is likely to want to do if he wishes to maximise his chances of getting the job. It is apparent from this discussion that there are multiple conflicting criteria that might be relevant in assessing this problem, and thus an MCDA frame might be useful.

2.4 Multi-Criteria Decision Analysis

Taking an MCDA perspective [1], one might ask, "How does this project rate? With what should this project be compared? What are the criteria for successful projects?" An MCDA frame might lead to an identification of criteria for judging potential projects, to scores for this project on these criteria, together with weightings for these criteria, so that an overall 'score' for this project can be derived. This would then be compared with other available projects in order to decide whether to bid for this project or not. An obvious use of this frame would be for the project to be given the go-ahead if it passes some benchmark score arrived at by weighting the criteria in a predetermined way.

While MCDA approaches do not generally allow portfolio effects to be incorporated within the model, experienced users usually consider the notion of a portfolio of projects to balance out relative risk and returns. A sensible application of the MCDA decision-making process would also look for weaknesses in this project on any individual criteria and the risk may be cited as a reason for vetoing this project; and hence, risk management issues may be raised. If an MCDA approach were to be used, the actual model may well need to evolve over time, as different projects surface new points of differentiation, raising questions of what criteria are used in the evaluation, and what weights they should be accorded.

This frame highlights the multi-faceted nature of projects, and that it is rare to find a project that performs well on all criteria. In accepting such trade-offs as the norm, we may reject projects without considering how they could be modified to avoid such trade-offs. This is in direct contrast to the Evaporating Cloud frame (2.2 above).

2.5 Linear Programming Frame

One could think more strategically still, and ask the question: what is the best product mix to pursue? If each project could be categorised in terms of its return, risk, resources required, etc, then what mix of projects would yield the overall best return for a given level of resources and risk allowed? In some circumstances, we might consider return versus effort, but as the company is short of work at present, effort would appear to not be a constraint. Risk may be seen to be the binding constraint in this frame.

This frame would highlight the linear additive nature of projects – and assume that resources are consumed in proportion to the size of the project. The frame shadows any synergies between projects, sequences, timing, resource scheduling, variability and so on, which can be addressed using the Theory of Constraints frames.

2.6 TOC Product Mix heuristic

If we know the biggest constraint, then we can use the TOC product mix heuristic [4,8]. For example, if risk is the constraint as suggested above, this TOC heuristic would suggest we choose jobs on the basis of maximum return per unit of risk, until the risk limit is reached. We may ask, can we reduce the risk per $ return?

2.7 TOC Five Focussing Steps (POOGI)

Alternatively, we may need to ask "What is the constraint?" and use Goldratt's Five Focussing Steps in the Process Of On-Going Improvement, see [7, 8].

1. ***Identify*** the constraint: eg we might identify the constraint for the business as not enough jobs.
2. ***Exploit*** the constraint: If the number of jobs is the constraint, how can we exploit this?
   Accept all jobs: focus resources on winning the job and making it a success.
3. ***Subordinate*** other decisions to the above decision:
   Bid low to ensure getting the job.
   Apply extra resources to this job. (Since "not enough jobs" is the constraint, by definition we have surplus staff, so these should be used to ensure the job is done quickly and on time, and is billed for promptly.)
   Prepare press releases and get the press on side to ensure the project is successful at least in the sense that the company's reputation is unscathed.
4. ***Elevate*** the constraint:
   Find more jobs.
5. If anything has changed, ***Go back***:
   Maybe jobs will cease to be a constraint and something else (staff, or risk) will become the constraint. If so, go back to step 1. The above recommendations will no longer apply once the constraint has changed.

There appears to be a conflict in Step 3 – Subordinate, with both 'Bid low' and 'Spend extra resources' (ie bid high), but it makes perfect sense if staff costs are fixed in the short term. A probable resolution would be via marginal costing, addressing the hidden assumption that quoted price is based on the sum of component costs.

2.8 Theory of Constraints (TOC) logic trees

There are several of the TOC logic trees that could be used jointly and/or independently for this case [5, 3]. The Current Reality Tree (CRT) would help the decision-makers improve their understanding of the root cause(s) of the dilemma: why are we bidding for a job that is so risky? How can we shape our business, perform better, use our constraints better? What are our internal performance measures and goals that are putting us in this dilemma? Why are jobs hard to find? We would seek to identify underlying causalities and dependencies in order to identify the best leverage points for positive change. The TOC analysis would then lead through to develop a solution using the Evaporating Cloud (2.2) and test and implement this 'solution'.

Individual TOC tools can also be used on their own. Sarah and Dick can use cause-effect logic together with their intuition to explore the nature and cause(s) of Sarah's concerns and how they may be addressed. They could then develop a strategy to prevent the negative consequences from occurring, while at the same time being able to undertake the job and improve the company's financial position. This particular use of cause-effect logic is referred to as the Negative Branch method in Ch 8 in either [5, 3].

Another tool, a 'Prerequisite Tree' (see [5, Ch 26] or [3, Ch 9]) is used to devise an action plan to achieve a difficult target – in this case that target could be how to make this particular job a success, or being more ambitious still, how to turn the company around. This tree would start off by listing obstacles that stand in the way of achieving the target. Actions or states that must be achieved in order to overcome these obstacles are then identified, and sequenced to form an action plan.

2.9 Data Envelopment Analysis (DEA) Frame

Data Envelopment Analysis [10, ch 9] could be used to surface issues of relative effectiveness or efficiencies of project, for example in terms of effort vs return.

2.10 Simulation

Following on from the decision tree frame, a discrete event simulation [10, Ch 5] could be used to investigate the effects of variability and the sequences of decisions and outcomes, as the events unfold, leading to a better idea of the range of possible outcomes following possible decisions. The simulation frame will highlight that the system as a whole is not necessarily predictable from the sum of its parts, and that we should test different strategies and options by performing various "runs" of the model. The effects of variability, the need for replications, and the development of a long-run 'best strategy' are prominent in this frame.

2.11 Project Management

This frame would highlight the actions required to manage the project through to a successful conclusion, by identifying sequences of tasks and likely timings. Using TOC's Critical Chain method [6] would help the decision-makers focus on resource contentions and buffers. The uncertainty surrounding the winning or not of the contract would generally be ignored under this frame.

3. Use of Multi-framing in the Classroom

We use multi-framing in the classroom both formally - using many frames deliberately for analyzing a case like the one above - and informally, using other frames to complement a main discussion. What we have found is that most methods provide useful insights - if used with common sense – even just as back of the envelope sketches, and even using methods that do not look remotely suitable initially. Most importantly, none of the frames on its own would have come up with all the good ideas.

Each model is based on assumptions, and these do limit the view of the problem, and the suggestions that arise from the frame. So if each frame has assumptions, what are they? Our normal MS/OR training encourages us to state our assumptions at the outset, but many are too implicit for us to think to state them. We know we should ask "Are the assumptions valid?" but often forget to do so in the face of time pressures and for

reasons of expediency (clients don't want to know what the limitations are - they want answers!). While the checking of validity is recommended as good OR practice, we should probably instead assume they not valid, and ask "What if the assumptions are not valid?" In fact the multi-framing approach probably provides greatest benefit simply through assuming that assumptions are *not* valid, rather than seeking to confirm their validity.

When approaching a case like the one discussed in this paper, we have found it useful to develop the individual frames on the board, and then collect them together in a wheel as in figure 1 (actual example available from authors). In this way, the best ideas and common themes can be collected in the centre, to form a robust strategy:

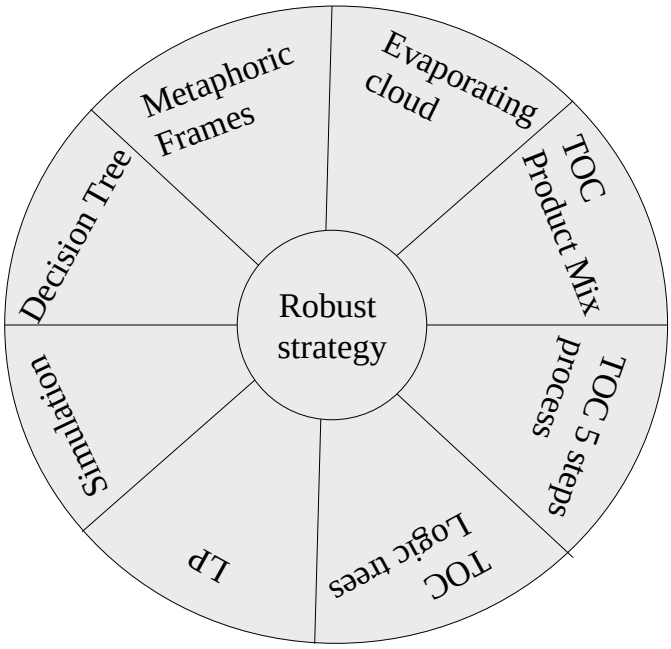


Figure 1. Wheel diagram summarising main points from individual frames and emergent robust strategy

For this example, an emergent robust strategy might be:

- Negotiate terms and conditions to maximise chances of success: Bid high enough to cover likely costs of damage control and special expertise to replace Sarah, or to make the project acceptable to her, but not too high so as to lose the job.
- Seek an extension to the time available.
- Use the scarce time (constraint) wisely (using critical chain project management).
- Get everyone on side and on board.
- Focus resources where they're most effective.
- Manage the risk (eg through public relations or a confidentiality agreement, and project management).
- Select projects on a range of criteria, not just profit.
- Prioritise jobs based on $ return per unit of the constraint (eg risk).
- Don't just take what comes: be proactive - challenge the assumptions!
- Make it a success!

It is interesting to note that the criteria driving choice and therefore the favoured choice within frames is related to the boundaries implicit in the frame. Some examples are: With short-term boundaries we consider this job only, but if we consider the long term, then we consider jobs in general; Profit may be the sole criterion, vs profit as one of many criteria (in the MCDA frame); Reactive (tender or not tender for this job), vs proactive (shape projects, improve chances of success, manage risks etc); Full cost pricing vs marginal pricing (bid high, vs bid low).

Each frame has its own strengths and weaknesses, shadows and highlights, leading to different insights. Using several methods helps us devise robust strategies more fitting to the messy complex worlds we live in than using any one single method.

4. Summary and Conclusions

The paper has shown by way of an example the use of a multi-framing approach to generate robust strategies for a problem. While there is a tendency to want to pick the right method for a problem, using multiple frames as above illustrates that in any situation, there is not necessarily any one best method, and that one can benefit from using a variety of frames to provide the different insights and highlights that diverse frames provide.

Some might argue that this is simply a case of the modeller choosing the wrong frame, a case of mistaken identity. But we think it is more a case of multiple identities. And that the most natural way to deal with multiple identities is to use multiple frames. Furthermore, the use of many different frames helps overcome the partiality of any one frame, because aspects hidden by one frame may be highlighted by other frames. In this way, the frames are complementary in an informative way rather than necessarily in terms of a modelling sequence or multimethodology.

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