

The Ship And The Voyage

Presidential Address to the Twenty-Ninth International Conference
of the System Dynamics Society, July 26th 2011 Washington, DC

David C. Lane¹

It is an honour to have the opportunity of the Presidential Address to speak to one's colleagues.² Some colleagues in the System Dynamics Society may have noticed that I am English. I think of that, and of the fact that it is fairly early in the morning, and that brings to mind a remark from a fellow Englishman. During the nineteenth century the politician William Gladstone was campaigning and he kept a diary. There is one entry in which he records how he made a long speech in the middle of the day and then walked 15 miles to a small village. Gladstone wrote: "*I noted immediately upon my arrival that the [people] seemed somewhat jaded, I therefore restricted my remarks to one hour and three quarters*". So, in case you are wondering what is going to happen now, I can at least assure you that in less than 30 minutes this will all be over.

Being President of the System Dynamics Society is also very interesting. That is because of the perspective that it encourages you to adopt. As President you get to see all of the work needed to make the System Dynamics Society run. You also get to stand back and see the whole system. It forces you to ask; "What is the best thing to do for the field as a whole?" From that perspective you see that the Society serves its members and serves the field. To a large extent, the field self-organises. It is the sum of its parts, a collection of interests reasonably - but not perfectly - aligned.

Of course, we have a permanent staff in the Home Office and I will return to them later. But overwhelmingly the Society consists of people who volunteer their time and energy because they care about System Dynamics. I believe that what keeps this going is that we are a group that should be, needs to be, in constant debate about what it is we are trying to achieve.

So I would like to offer my thoughts on that question: what are we trying to achieve? To do that, first, I am going to offer some external perspectives which generate interesting questions - questions which I think it would be useful if everyone thought about and contributed answers to. Then, I am certainly going to take the opportunity of this address to give some answers – well, some opinions - of my own. But I hope to raise more questions than I offer answers to. I think that it is important that we all keep thinking and talking about some of these issues, not least because some of these questions are difficult to answer. Then, in the second half of this address, I will try to remind us of the power of System Dynamics and of the System Dynamics community, and of why it is worth struggling with these questions.

External Perspectives

In preparing this address I found three external perspectives that seemed relevant, relevant because they give rise to some questions that we can usefully ask ourselves.

The first perspective comes from the field of sociology. In 1975, in his *Presidential Address* to the American Sociological Association, Lewis Coser was highly critical of two developments in sociology which he thought were endangering his own field. (In this instance, he was specifically criticising the unthinking use of quantitative approaches and Garfinkle's new ideas on Ethnomethodology.) He said that he was, "... perturbed about present developments in American sociology which seem to foster the

¹ London School of Economics and Political Science, Houghton Street, London WC2A 2AE, England.
Email d.c.lane@lse.ac.uk

² The text here is based on the talk delivered at the Washington conference.

growth of both narrow, routine activities, and of sect-like esoteric ruminations...” (Coser, 1975, p. 691). He went on to say that; “Sects are typically closed systems ... They attempt to reduce communication with the outside world to a minimum while engaging in highly intense interactions between the True Believers” (*ibid.* p. 697).

What questions does this perspective provoke? We might ask ourselves: Are we a ‘closed system’? I do not think so myself, so perhaps another question worth considering is: Do we look like a ‘closed system’ to others? If that cannot be ruled out then it raises a further question: What consequences would that have for us? We will return to these questions.

Another pair of perspective comes from the fields of management science/operational research and management studies itself.

In 2008 Sodhi & Tang published a paper on the state of MS/OR called *The OR/MS ecosystem: strengths, weaknesses, opportunities, and threats*. In their paper they criticised the field for being too mathematical, for having withdrawn from practical problem solving and for being irrelevant to management, particularly senior management. They blamed the incentives that exist for academics (Sodhi & Tang, 2008).

In 2007 Jeffrey Pfeffer published a paper; *How we might change the process and product of managerial research*. He criticised the field for being too interested in abstract theory building and for not being relevant to actual managers (Pfeffer, 2007).

These two papers are remarkably insightful and honest critiques of two areas very close to System Dynamics. These authors are saying that there are constraints that structure their fields and that that structure leads to certain behaviour.

What questions does this perspective provoke? We might ask ourselves: What constraints does System Dynamics face? What structure do we have to work within? How will that structure influence our behaviour as a field? We will return to these questions.

The last perspective comes from H. G. Wells. The author of *The War of the Worlds* and *The Time Machine* was also a member of the Fabian Society. The Fabians were – and are – a group of people who wanted to bring socialist ideas to Britain. But they wanted to do it via democratic means rather than revolution.

The name Fabian comes from the Roman general Quintus Fabius Maximus Verrucosus – known as ‘Cunctator’, or ‘The Delayer’. During the Second Punic War Rome had suffered disastrous defeats at the hands of the Carthaginian general Hannibal. So Fabius decided not to confront Hannibal in pitched battle but instead to delay, to adopt a strategy of indirect harassment and attrition to wear down his opponent. Today this is still known as the ‘Fabian strategy’. Indeed, George Washington has been called ‘the American Fabius’. Meeting today in the city that bears his name we can contemplate how successful that strategy proved to be.

Certainly, with this approach, in time, many of the political objectives that the Fabians argued for came about in Britain - and other countries. In time. But in 1906, in his pamphlet *Faults of the Fabian*, Wells criticised the Fabians for procrastination, for delaying, for sitting around and talking rather than getting on with the job, for not being ambitious enough or bold enough (Wells, 1906). ‘Take it slowly’ was being used as an excuse.

What questions does this perspective provoke for system dynamicists? Are we going too slowly? Or are we pacing it just right? We will return to these questions.

Taking all of these questions together as a start, I would like now to think about the field.³

³ I will refer throughout to both the System Dynamics Society and the System Dynamics field. Whilst I know that they are not the same, they are closely related.

What is the Voyage?

System dynamicists like the metaphor of the ship captain versus the ship designer. We might think of the System Dynamics Society as a ship. That then provides a more specific question that I would like to explore: What is the voyage that we are on?

Many of the central activities that keep the ship working occur at the home office in Albany. I know that I am not the first President who experienced this but it was really only when I became President Elect that I properly came to understand how much work goes into keeping the Society running. Things do not happen by magic but because we have a dedicated team of people who make things like this conference happen.

I would like to take this opportunity to thank them for their work: Jaehee Jong, Erin Sheehan, LouAnne Lundgren, Navid Ghaffarzadegan, Joan Yanni, Robin Langer and Roberta Spencer.

On board the ship we are busy with the set of activities we have decided on. The Society's Byelaw V, Section 2 says that the President is the Chief Executive Officer of the Society, so it seemed natural to me to make sure that we are doing those things as well as we can. As a result, we have a new committee, chaired by Bob Cavana, called the *Ad Hoc Committee on the Organization of the System Dynamics Society*. Its job is to look at similar organisations across the world and to examine how they go about their activities. I think that a lot of useful information is going to emerge from that.

However, I want to return to that broader question: What is the voyage that we are on?

Ultimately, how good a ship we have depends on where we are trying to get to with it. Where, then, is this Society going? Where is the field going? What does 'success' look like? I would like to offer some possibilities (see Table 1).

(1)	Accepted into the MS/OR toolkit
(2)	Accepted into management thinking as a formal theory building approach
(3)	Accepted into social science thinking as a formal theory building approach
(4)	Accepted into social science thinking as the premier approach for modelling dynamic phenomena.
(5)	Accepted by the public as an approach for illuminating policy questions.

Table 1: Potential aims for the field of System Dynamics

In fact, we can make a good case that we have met some of these. Aim (1) is such an example: in the last 20 years System Dynamics has becoming increasingly accepted as one of the standard approaches in the MS/OR toolkit.⁴ However, to some that might seem like too narrow an aspiration for the field. So perhaps we might think more broadly and aim at success within the broader area of management studies as indicated by Aim (2). Note that if we do that then the use of simulation models is not as natural and well-understood an approach as it is in MS/OR. So adopting that aim involves our having to

⁴ One measure of this is the IFORS OR Hall of Fame. In 2003 the International Federation of OR Societies inaugurated a list of pioneers in operational research. The aim was "to celebrate significant contributions made to OR" (Rand, 2006, p. 583). One of the only 23 people selected was J. W. Forrester.

make the case for a model-based approach to formal theory building. Considerable progress has been made towards this aim too. However, to some people at this conference and in the System Dynamics community, ‘management studies’ is still too narrow an area of operation. Which is why Aim (3) sets its sights on having System Dynamics contributing across all of the social sciences. This is a bolder aspiration and one that is consistent with Forrester’s earliest views on the field (Forrester, 1961). Is it bold enough? We might go further and adopt Aim (4), with the intention of having System Dynamics accepted as the most powerful approach for understanding phenomena that evolve over time. That is very ambitious – arguably the peak of ambition regarding those specialising in the realms of research into policy and senior policy makers. However, we could aim higher;

“Forrester sets great store by the ability of system dynamics work to inform discussion amongst a wide range of people, not just “policy makers”. His view is that policy makers are most strongly influenced when they are answerable to those who have a good grasp of the dynamic consequences of policy options. He applies this idea to corporations (Forrester, 1965) but also to matters of public policy.” (Lane, 2007, p. 108)

That leads to Aim (5), in which the ideas of System Dynamics are understood by citizens who then demand not only of their managers at work but also of their politicians the rigour of such thinking. Clearly this is the most ambitious voyage of all.

It is worth observing that if we had any of those goals then it would certainly mean that we are not a closed system. We would therefore not have to worry about a Lewis Coser critique. However, recalling the lessons from Sodhi & Tang and from Pfeffer we might ask: how much does it constrain System Dynamics to be part of these other fields, to be open to them? It is all very well not being a closed system but is there a risk of being so ‘open’ that we lose our identity? I am reminded of the aphorism: *If you open your mind too much, your brain will fall out.*

We could also ask when it is that we are supposed to achieve any given level of success. In five years? 10 years? 50 years? Are we sensible, prudent Fabians, or would HG Wells say that we are not being bold enough and getting on with the job? To think about these questions we need to have a clear idea of the nature of the work that we want to do.

One way to think about this is to use the framework created by Donald Stokes in his book *Pasteur’s Quadrant: Basic science and technological innovation* (Stokes, 1997). It can be used to examine the nature of research activity and I think it tells us something about System Dynamics.

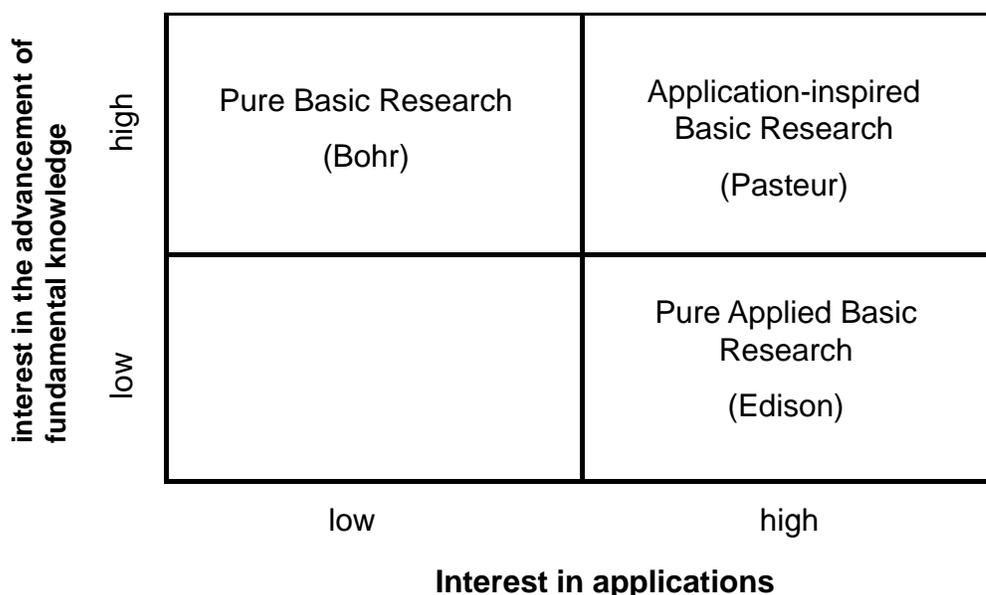


Figure 1: Stokes’ categorisation of types of scientific research activity.

Stokes proposes a two-by-two box (see Figure 1). The vertical axis indicates the level of interest in the advancement of fundamental knowledge: low or high. The horizontal axis then indicates the interest in applications: low or high. The resulting research quadrants are identified with individuals. In the upper left quadrant Niels Bohr exemplifies research centred on fundamental knowledge with little interest in any applications. In the lower right quadrant Thomas Edison exemplifies an approach which uses the knowledge that we have to hand to solve the problem that confronts us in the best way. Finally, upper right is Pasteur's quadrant. He did his work on bacteria for the wine industry in France. He was certainly generating knowledge but he did it in ways, and towards ends, which had practical relevance as a major concern.

From the point of view of this framework what, then, is the voyage? One of the many pleasures of the System Dynamics community is the range of people you find in it – and the good relations between them all. We are a collection of people: academics, practitioners, educators. Are we on different voyages? It is possible, though I think that would be very damaging. However, recall what Forrester says; “life must be very practical. It is not theoretical, it is not conceptual without purpose. One works to get results” (Forrester, 1990 p. 2). This is the engineering urge at the centre of the field, and that urge attracts all of us. So whilst, in what follows, we find differences in emphasis amongst the range of people in the System Dynamics community, I think that we are all reasonably comfortable in Pasteur's quadrant.

If we concentrate on academics, then they tend to be on the top row of the framework. Perhaps those effects that Sodhi & Tang (2008) and Pfeffer (2007) describe have the effect of pushing them to the left of that row, more towards the Bohr quadrant but they are also there in Pasteur's quadrant, trying to understand real world phenomena using System Dynamics. Of course, when it comes to applicability, they need the strong signals from practitioners.

Turning to them, my expectation is that practitioners are over in the right hand column of the framework, perhaps concentrating on Edison's quadrant but, because they are still interested in methodology that helps them, comfortable also in Pasteur's Quadrant. Moreover, they also perfectly aware the 'Bohr' type activity is needed if System Dynamics is to innovate and be able to answer new practical questions.

Where might educators be found? Everybody needs them and they have successfully introduced System Dynamics across all three of the 'named' quadrants. That is because their interests involve System Dynamics being used to solve practical problems but also being used to help people think about much deeper questions, being used to support pure critical, reflective thinking.

My suggestion is that in thinking about the voyage that we are on we can use this framework to think about where we are, where we want to be and where we are pushed to be. However, in closing this section, I think that it is worth repeating that a great strength of System Dynamics is that we can all gather in Pasteur's Quadrant. I think that we need to make sure that most of what we do stays there in the future. There are three reasons for this. First, because to do so is to be true to the founding ideas of the field. Second, because it also fits with the interests of most of us. Third, because retaining a strong presence in Pasteur's quadrant is most likely to get public acceptance for the field – now and in the future. Being useful but being able to innovate to keep being useful is a good goal to have.

The Cargo and the Travellers

In the previous section I attempted to raise some questions about where this voyage is headed, questions that we need to confront. So I would like now to say something about the power of System Dynamics, in order to show why it is worth struggling with these questions.

I am aware that to many readers this will be merely a reminder but I hope a worthwhile one. Nevertheless, I would like to try to convey something of the enthusiasm that system dynamicists have for what they do by offering my own personal impressions of why System Dynamics, and the System Dynamics community, deserve our support and our energy.

I have spoken about the ship and offered some thoughts on possible voyages. Where, then, does that leave the cargo and the travellers? Whilst there are unanswered questions about the voyage, I am very

sure about the cargo and the travellers. I believe that this ship has a valuable cargo and a fine bunch of travellers. I will say something more about both of these below

The cargo is System Dynamics: a rigorous approach for thinking about the structural source of behaviour over time. It is a valuable cargo, relevant and practical. I know that those of us in the field are all aware of how relevant System Dynamics is to the world, how often you find that you can use it to illuminate things. However, about a month ago, in a 24 hour period, I came across three examples of why that is true. I would like to share those here.

The first example showed how relevant and useful System Dynamics is for understanding feedback effects. *The Guardian* newspaper had an article which reported that:-

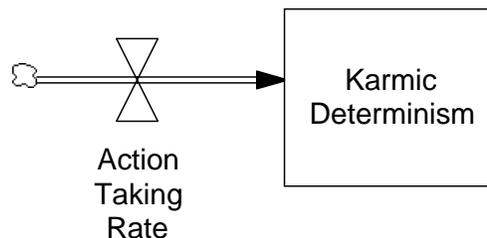
*“Two sugary drinks a day can dull taste buds, study claims
...those who drink sugary beverages are left with a dulled sensitivity to sweet tastes. This leads to an increased preference for high-calorie and sugar-laden foods, creating a “vicious cycle” as consumers look for their next treat.”*

The Guardian, 9th June 2011

The empirical data and the verbal description contained in the article are a good start to framing this phenomenon. However the feedback thinking of System Dynamics can help us understand it further.

The second example reminded me how relevant and useful System Dynamics is for understanding stock and flow relationships. On the radio news program I listen to in the morning a Buddhist was talking about his beliefs and he said that:-

“Acts become habits. Habits become character. Character becomes Destiny.”



This puzzled me for a moment until I realised that it could usefully be interpreted as a flow ‘Action Taking Rate’ accumulating into a stock of Karmic Determinism. That key System Dynamics distinction of flows and stocks was relevant to what I had heard and useful for understanding it further.

The third example revealed again how relevant and useful System Dynamics is for understanding behaviour over time. During the same brief period when I saw the newspaper piece and heard the comment on the radio, I was reading E L Doctorow’s novel *Homer and Langley*. At one point in the novel the two eponymous brothers are discussing a song about how a man and a woman react to each other:-

*“Well take that song where he says sometimes he’s happy sometimes he’s blue.
“... my disposition depends on you.”
Yes, well what if she’s saying the same thing at the same time?”*

Who?

The girl, I mean if her disposition depends on him at the same time his disposition depends on her? In that case one of two circumstances would prevail: either they would lock together in an unchanging state of sadness or happiness, in which case life would be unendurable –

That's not good. And what's the other circumstance?

The other circumstance is that if they begin desynchronously, and each was dependent on the other's disposition, there would be this constantly alternating mood current running between them, from misery to happiness and back again, so that they would each be driven mad by the emotional instability of the other."

Homer and Langley, Doctorow (2010), pp. 73-4

What is being described here is a pair of behaviour modes along with ideas about why arise. Now bring together the idea of feedback and the distinction of stock and flow variables and these propositions could be tested rigorously using System Dynamics.

I would like to emphasise that I came across these three examples quite by accident in a 24 hour period. In them you see the ideas of feedback, stocks and flows and a causal theory explaining behaviour over time. The fact that one can naturally stumble across situations in which those ideas help in understanding what is going on tells you that there is something powerful about those ideas. It says something about the relevance and practicality of System Dynamics – the value of the cargo.

So the ship has a cargo worth delivering: it is relevant and practical. It also has fine collection of travellers.

System Dynamics brings together people who you might think are different. In his book *Identity and Violence: The illusion of destiny*, Amartya Sen (2006) describes how the world tries to define people by one attribute only and then declare that they are different. Hindus/Muslims was his first example but to this we can add; Muslims/Christians, Serbs/Croats, geeks/jocks, poets/engineers, in group/out group, A/B. This is the 'solitarist' idea that people have only one identity, that human identity is formed by membership of a single social group, that people in a different social group are fundamentally different from each other. Sen argues that this leads to a 'miniaturisation' of humanity. I think that the same idea was expressed in a story I recently heard on the radio from the civil war in Yugoslavia 20 years ago. A village had been attacked and people were fleeing. A journalist was there and he got talking to an old man. He asked the old man, "Are you a Serb or a Croat?" The man replied, "I am a musician". Sen says that people are members of many different groups and in that matrix of interaction apparently different people can find something in common. The thing that we have in common, that binds us, is System Dynamics

In the first book of his *Elements*, Euclid (2000) says something similar in his First 'Axiom', or 'Common Notion': 'If two things are equal to the same thing then they are equal to each other'.⁵ I think that something like this happens in the System Dynamics community: if Person 1 and Person 2 both have a connection with System Dynamics then Person 1 and Person 2 can find a connection with each other.

One of the things that I value about the System Dynamics Society is that it is one way in which we explore that matrix of interaction. I believe that we should not take this for granted. You will all have your own experiences of this, with other travellers. I would encourage you to remember them. Here are a few of mine. Because of System Dynamics, I have listened to a Norwegian colleague tell me how much he enjoyed an Italian comedy film. Because of System Dynamics, I have been to dinner in Switzerland with a Danish colleague and discussed our love of Shakespeare. Because of System Dynamics, I have sat on a train in The Netherlands and listened to an Italian colleague describe with wonder an ancient reed boat that he saw in Egypt. Because of System Dynamics, I have walked through London with an American colleague as we shared our interest in ancient Japanese temples.

⁵ Today we would express this algebraically as: $A=B$ and $C=B \Rightarrow A=C$.

These connections break any ‘solitarist’ view we have of ourselves. System Dynamics is the motor that brings this about, the cargo that makes us all travellers together.

In Summary

To reiterate: we should discuss the voyage that this Society, this field, needs to be on. The key question for us is: where are we trying to get to? Let us talk about it. It is the task that confronts us.

However, whilst we are having that discussion, we should remember that the cargo that we carry and the people we are travelling with are the things that make it worth thinking carefully about that voyage. The cargo can arouse strong feelings. One of the students who studied System Dynamics modelling with me at LSE this year wrote on Facebook; *There are other modeling and simulation techniques, but only system dynamicists get up in the morning and go "damn, we're awesome"*.

We should also discuss the voyage in the context of our being a social group, drawn from many places but all sharing a fascination with System Dynamics.

At the start of this address I described myself as English. True - but not always the most relevant thing. I am a system dynamicist. So are you. Let us complete this voyage.

Thank you very much for your time.

References

- Coser, L. J. (1975). Presidential Address: Two methods in search of a substance. *American Sociological Review* **40**(6): 691-700.
- Doctorow, E.L. 2010. *Homer and Langley*. London, Little, Brown Book Group.
- Euclid. 2000. *The Thirteen Books of The Elements: Volume 1: Books 1 and 2* (edited by T. Heath, 2nd ed.). Mineola NY, Dover Publications.
- Forrester, J. W. 1961. *Industrial Dynamics*. Cambridge MA, MIT Press.
- Forrester, J. W. 1965. A New Corporate Design. *Industrial Management Review* (now the *Sloan Management Review*) **7**(1): 5-17.
- Forrester, J. W. 1990. *The Beginning of System Dynamics*. System Dynamics Society: Albany.
- Lane, D. C. 2007. The Power of the Bond Between Cause and Effect: Jay Wright Forrester and the field of system dynamics. *System Dynamics Review* **23**(2-3): 95-118.
- Pfeffer, J. 2007. A Modest Proposal: How we might change the process and product of managerial research. *Academy of Management Journal* **50**(6): 1334 -1345.
- Rand, G. 2006. IFORS’ Operational Research Hall of Fame. *International Transactions in Operational Research* **13**(6): 583-584.
- Sodhi, M. S. and C. S. Tang 2008. The OR/MS Ecosystem: Strengths, Weaknesses, Opportunities, and Threats. *Operations Research* **56**(2): 267–277.)
- Sen, A. 2006. *Identity and Violence: The illusion of destiny*. New York , W. W. Norton & Co.
- Stokes, D. E. 1997. *Pasteur’s Quadrant: Basic science and technological innovation*. Washington DC, Brookings Institution Press.
- Wells, H. G. 1906. *Faults of the Fabian*, London, Fabian Society.