



Hello and thank you for inviting me to present at this year's conference.

I am Peter Vanderminden, I work for JP Morgan Chase as the principal architect for business process management and systems architecture for our treasury and security servicing businesses.

The paper I am presenting, "System Dynamics – A Field of Study, a Methodology or Both" is primarily about exploring some very fundamental questions and attempting to answer for myself just what is System Dynamics.

These are questions that I have had to confront as I have sought to make use of System Dynamics and win converts to its use within JP Morgan Chase.

The answers I have developed to these questions may be quite challenging to a number of you.

I recall that at the 2001 Conference, one of the eulogists for Dana Meadows recalled that a key lessons that he learned from her was how thrilled she was when clients got into quite heated debates about the models they were creating.

This indicated to her that she had really engaged the clients and had gotten them thinking about fundamental questions.

What is System Dynamics?



1. System Dynamics is a field AND is not a methodology.

$(SD = F) \text{ AND } (SD \neq M)$

2. System Dynamics is a methodology AND is not a field.

$(SD = M) \text{ AND } (SD \neq F)$

3. System Dynamics is a field AND a methodology.

$(SD = M) \text{ AND } (SD = F)$

Lets have a show of hands

How many people here consider themselves to be System Dynamicists?

System Dynamics is a field AND is not a methodology.

System Dynamics is a methodology AND is not a field.

System Dynamics is a field AND a methodology.



System Dynamics Society

What Is System Dynamics

System dynamics is a methodology for studying and managing complex feedback systems, such as one finds in business and other social systems. In fact it has been used to address practically every sort of feedback system. While the word system has been applied to all sorts of situations, feedback is the differentiating descriptor here. Feedback refers to the situation of X affecting Y and Y in turn affecting X perhaps through a chain of causes and effects. One cannot study the link between X and Y and, independently, the link between Y and X and predict how the system will behave. Only the study of the whole system as a feedback system will lead to correct results.

The methodology

- identifies a problem,
- develops a dynamic hypothesis explaining the cause of the problem,
- builds a computer simulation model of the system at the root of the problem,
- tests the model to be certain that it reproduces the behavior seen in the real world,
- devises and tests in the model alternative policies that alleviate the problem, and
- implements this solution.

Rarely is one able to proceed through these steps without reviewing and refining an earlier step. For instance, the first problem identified may be only a symptom of a still greater problem.

The field developed initially from the work of Jay W. Forrester. His seminal book *Industrial Dynamics* (Forrester 1961) is still a significant statement of philosophy and methodology in the field. Since its publication, the span of applications

Where Can I Study System Dynamics?

The field of system dynamics can be studied around the world at both the undergraduate and graduate levels, as well as in executive education programs (non-degree). We hope this page will give you some ideas about where to study.

3

The System Dynamics web site proclaims that it is both a methodology and a field of study.

The first two paragraphs start by tell the reader that it is a methodology.

Then the third paragraph announces that it is a field of study.

If you click on the link to learn where you can study System Dynamics it advises where the field of SD is taught.

Clearly our primary marketing mechanism promotes the concept that SD is both a method and a field of study.

SD Conferences - Recurring themes of discussion



- Lamenting slow acceptance rate of SD by business, government, academics and other organizations.
- Seeking ideas for how practitioners can obtain greater acceptance, understanding and use of SD.

- Debates over what is and what is not SD.
- Practitioners advising that one is not practicing in the field of SD unless you were doing SD modeling.

I have been attending the System Dynamics conference since 2001 and have observed several recurring themes of discussion including:

Concern over the slow adoption rate of SD and how to increase it

Debates of what is and is not SD with purists insisting that SD was confined to the use of SD modeling.

This had led me to question if I am a practicing System Dynamicist and what it means to be one.

Defining SD?



- SD internet discussion list (1997) Fabian Szulanski asked participants to provide an "elevator speech" to explain SD in less than 30 seconds.
- Several of the most prominent writers in the field responded to the challenge including Forrester, Richardson, Richmond and Wolstenholme.

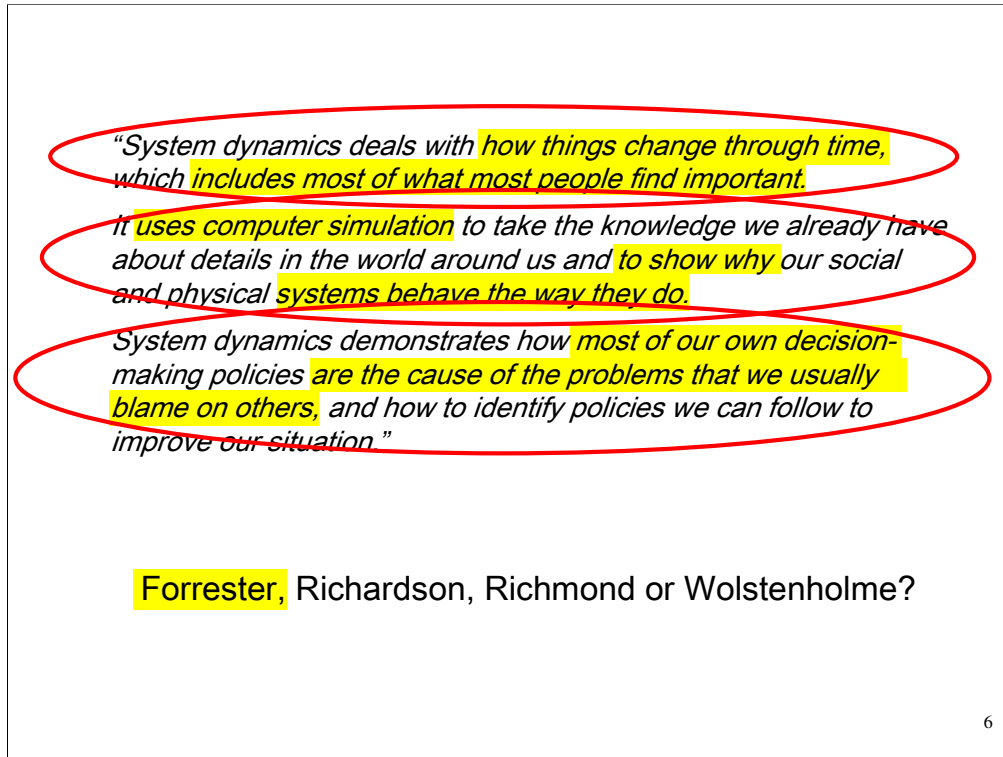
5

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As I have looked to come to an understanding of what is SD, it is clear that this has been an issue that has concerned practitioners for some time.

Back in 1997 Fabian Szulanski felt the need to ask the SD discussion list for a 30 second elevator speech to explain what SD was.

Among those who responded included such familiar names as Forrester, Richardson, Richmond and Wolstenholme.



Here is an example of one of the responses.

Lets deconstruct it to see just what is being communicated here.

It starts out telling the reader that SD is about "how things change through time which includes most of what most people consider to be important".

Now basically everything changes over time. Kinda sounds like SD is the study of everything, especially if its important. How's that for giving focus and definition. This tells the me nothing whatsoever.

Next this definition tells me that SD uses computer simulation to show why system behave the way they do.

I'm sorry... Let's get this straight once and for all. System Dynamics has nothing to do with computer simulation. Computer technology is not an end in itself it is only a means to an end. Technology is just an enabler. It does not define anything.

Accounting existed before the invention of Excel. Minitab does not define Statistics and the Egyptians managed to architect the pyramids a good 3000 years before AutoCad. In the financial services industry nearly all software applications I encounter use some form of computer modeling and simulation and darn little of it uses system dynamics.

If you are explaining System Dynamics to your audience as being characterized by computer simulation, quite frankly you don't get it and you are telling your audience absolutely nothing about system dynamics. Moreover, using this as a crutch in your explanation insults your audience and it implies to them that SD is beyond their comprehension and can only be understood through the use of black box device.

Finally, the definition concludes by telling the reader that SD "demonstrates how most of our own decisions....are the cause of the problems we blame on others".

WOW!...We really like to kick our audience in the teeth don't we. Not only is SD the study of everything, we use a computer black box to prove to you that you are incapable of making decisions and perceiving reality.

Now quite frankly I find this to be one of the most appalling bad definitions of SD that I have ever come across. I can't think of a worst way to market an idea.

Now who do you think is responsible for this so called definition of SD?..... Forrester

And notice that it says nothing about whether it is a method or a field.

Communication of System Dynamics?



- Essential to the acceptance of any new idea or innovation is the ability for its advocates to clearly and simply state what the concept is.
- People tend to reject or at least treat with skepticism things that they do not understand.
- The acceptance of SD may be due in part to the inability to succinctly communicate what SD is.

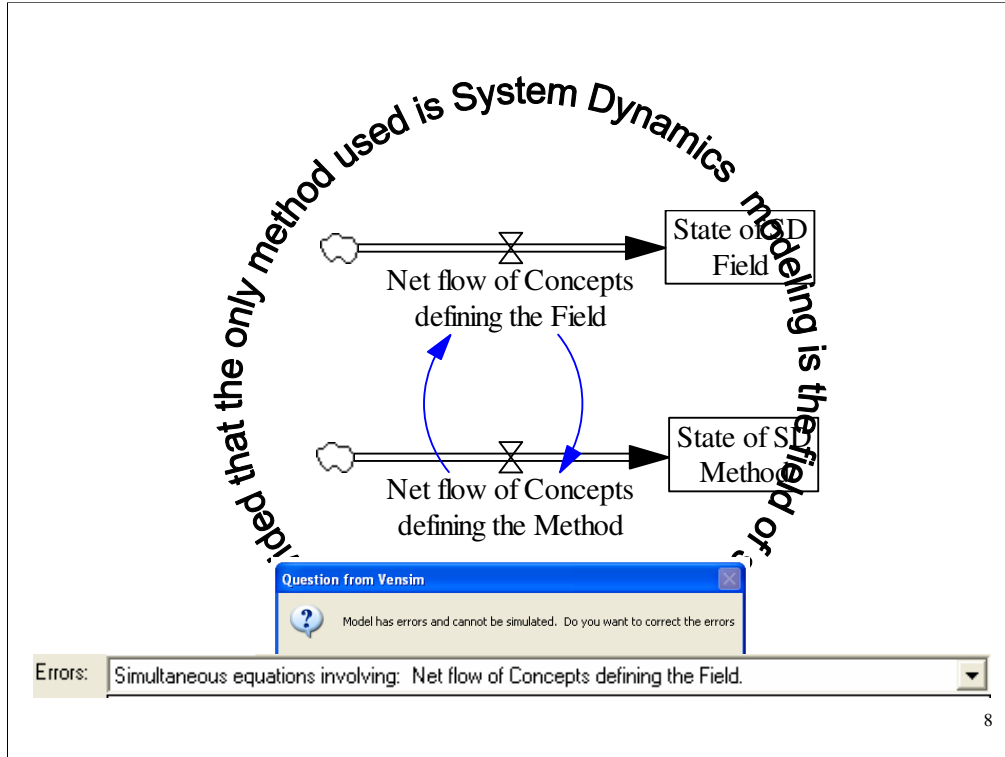
None of the other definitions that I have come across in reading the SD literature has really resonated with me. In fact I would say that I have grown increasingly frustrated with the lack of a clear and simple definition of what is SD. My own inability to explain it clearly to others has limited my attempts to obtain their buy-in. When I have tried to use the definitions such as the one from Forrester that I just critiqued it has generally blown up in my face.

I think we struggle to increase the use of SD as we struggle ourselves to explain it. Essential to the acceptance of any new idea or innovation is the ability for its advocates to clearly and simply state what the concept is.

People tend to reject or at least treat with skepticism things that they do not understand and when they see us struggle to explain it we are on a very weak footing.

I think a key part of the problem is that we attempt to give explanations that encompass aspects of both the methodology and the field all wrapped up together and as a result very mixed messages come out neither of which are clear.

I would now like to offer up the following as the most succinct definition of SD as both a method and a field that I can think of.

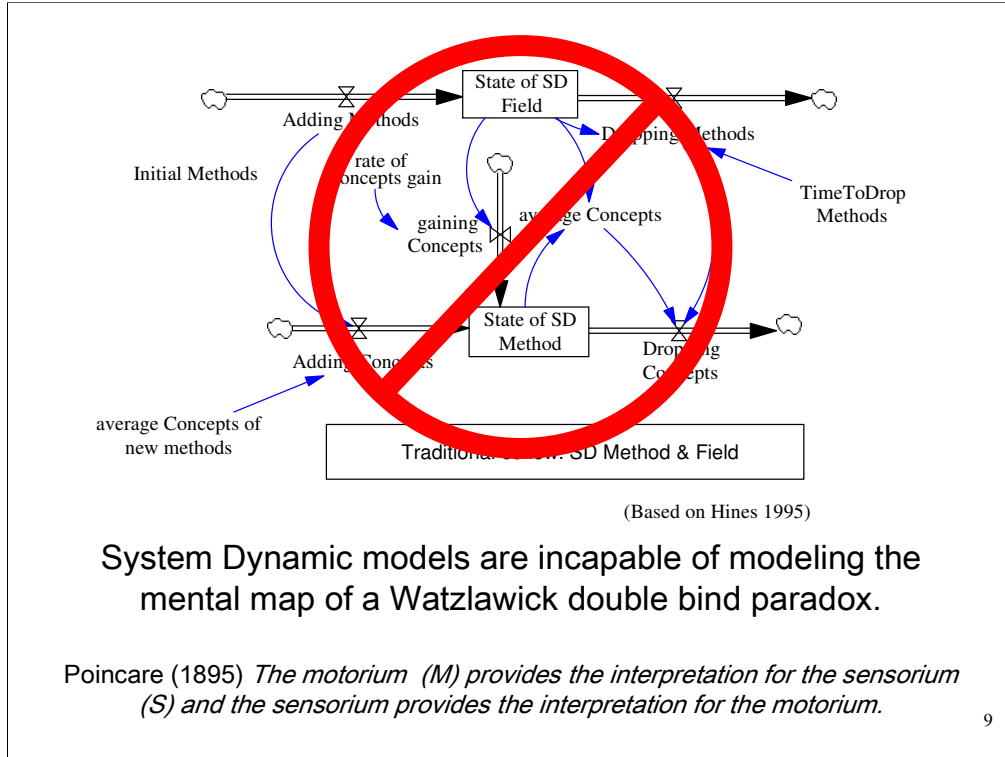


System Dynamics modeling is the field of studying system dynamics, provided that the only method used is System Dynamics modeling.

How's that for a feedback loop.

Lets try to model the relationship between the method and the field. Here is how I would depict it.

Now I am sure that most of you would be quick to point out that this is a flawed model. And in fact Vensim even advises it can not be simulated as we have self referencing simultaneous equations.

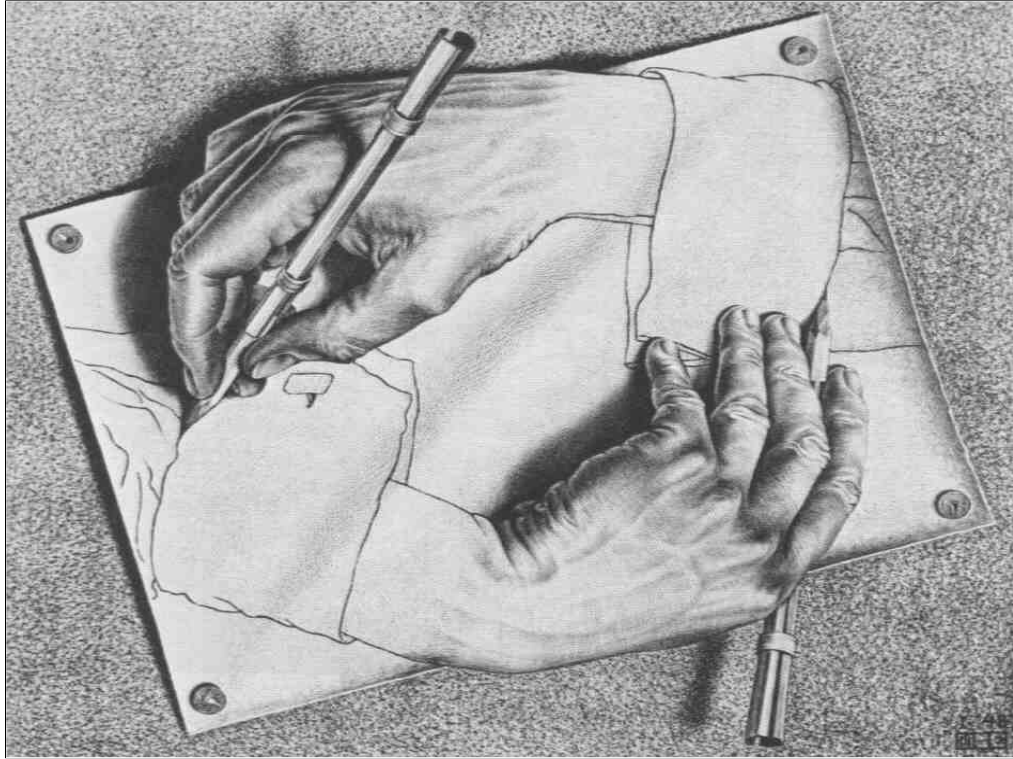


Now maybe you would prefer to model the relationship this way.

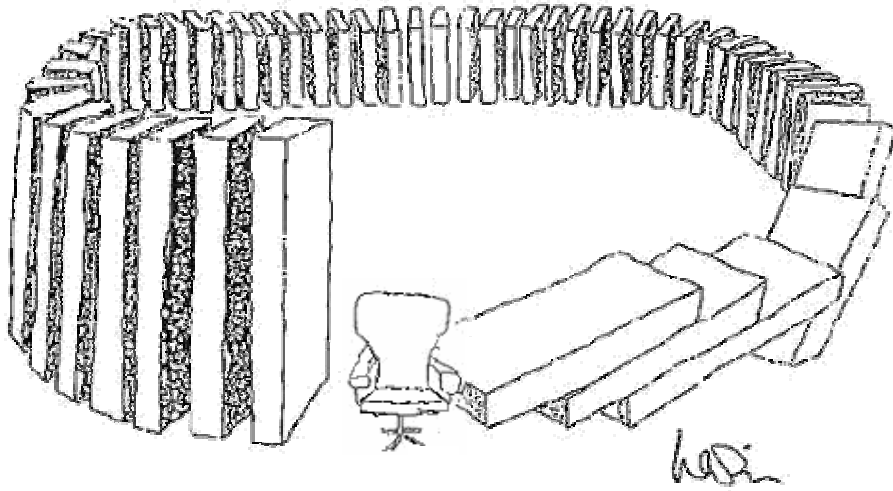
But I find this to be a flawed model. The model on the prior slide does a better job of describing my mental model of the relationship between the method and the field of SD. To me they operate as a Watzlawick double bind paradox.

Or to put it in terms of Poincare's Dynamical Systems, *The motorium provides the interpretation for the sensorium and the sensorium provides the interpretation for the motorium.*

Here is perhaps the most accurate depiction of the relationship between the method and the field of SD.



Paradox happens when you define something recursively within the same reference frame.



Get up out of the chair and step outside the reference frame.

11

Paradox happens when you define something recursively within the same reference frame.

The only way to break the paradox is to Get up out of the chair and step outside the reference frame.

What are the symptoms of paradox?



- Practitioners of SD routinely use the term SD to mean both a method and a field. As a consequence, one can not expand concept one without expanding the concept of the other.
- When the tool is applied to other fields of investigation, practitioners of SD appear to want to incorporate that work as now a part of the field of SD.
- The current situation is that the more the method is applied, the more unfocused the field becomes.
- Meanwhile, the SD Society struggles to find papers on just the field of SD.
- Furthermore, if one attempts to develop new tools or apply ones from other fields SD practitioner purists are quick to claim that those do not belong to the field of SD as they do not meet the self-referential test.

12

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It is correct that our software is telling us that our approach of defining the method and the field in terms of each other is wrong. It detects we have created a paradox.

That is why we struggle to explain what SD is as we have created self-referential definitions that come across like an optical illusion in which we have frozen the state of both and as a consequence are unable to advance the state of either.

When the method is applied to another field, say economics, have we made a contribution to field of SD?

The current situation is that the more the method is applied, the more unfocused the field becomes and the journal struggles to find articles on just the field of SD

We have an ever increasing range of topics offered for presentment at the conference and we have to announce themes for the conference and the journal.

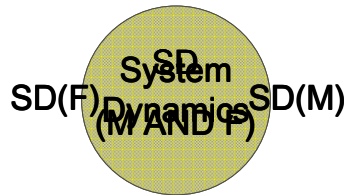
Furthermore, if one attempts to develop new tools or apply ones from other fields SD practitioner purists are quick to claim that those do not belong to the field of SD as they do not meet the self-referential test.

This is what I mean by a classic Watzlawick double bind paradox that has hamstrung the development of both the field and the method.

How can we break the paradox?



- 1) Need to decouple the method from the field.
- 2) Adopt distinctly different terms for each.
- 3) Develop operational definitions for both terms that are not self-referencing.



13

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How can we break the paradox?

I think there are three essential things that we need to do.

1. Need to decouple the method from the field.
2. Adopt distinctly different terms for each.
3. Develop operational definitions for both terms that are not self referencing.

I would suggest that for now we adopt the terms SD(M) and SD(F)

What are the objectives of the SD Society?



- Society should have two primary objectives:
 1. Promote the use of SD(M) to other fields as an enabling method of investigation.
 2. Advance the state of SD(F) as a field of inquiry.
 - Presumes that a field of SD(F) exists and can be defined separately from SD(M).
- The Society can not do justice to either goal without separating the two in name and definition so that both can:
 - Evolve independent of each other.
 - Be clearly positioned to relevant audiences.



14

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What should be the objectives of the Society if we separate the method and the field.

I think the Society should have two primary objectives:

- 1) Promote the use of SD(M) to other fields as an enabling method of investigation.
- 2) Advance the state of SD(F) as a field of inquiry. But this implies that a field of SD(F) exists and can be defined separately from SD(M).

In any event I don't think the Society can not do justice to either goal without separating the two in name and definition so that both can:

Evolve independent of each other and be clearly positioned to relevant audiences.

Why differentiate SD(M) and SF(F)?



- Essential to increasing the adoption rate of SD(M) is to remove any pretense of it being a field and forthrightly state that it is a method of investigation, nothing more.
 - Only then can we get buy-in from other fields that their use of SD(M):
 - Does not change their focus of inquiry to the field of SD(F),
 - Will not result in practitioners in the field of SD(F) attempting to co-opt their work into the field of SD(F).
- Evolving the state of SD(F) requires clear definition and distinct name without reference to any method.
 - Only then can will we be able to:
 - Encourage members of the field to develop new methods or use other methods they find appropriate to the field,
 - Expand our ability to better investigate, hypothesize and theorize about the object of inquiry to the field.



15

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Why do we need to separate the method from the field?

If we are to increase the adoption rate of SD(M) I think we need to remove any pretense of it being a field and forthrightly state that it is a method of investigation, nothing more.

Because only then can we get buy-in from other fields that their use of SD(M):

Enables them to better investigate their field of study,

Most importantly ... it does not change their focus of inquiry to the field of SD(F),

And removes the threat that practitioners in the field of SD(F) will attempt to co-opt their work into the field of SD(F).

Evolving the state of SD(F) I believe also requires clear definition and distinct name without reference to any method.

Only then can will we be able to separate the field from a method,

This frees us to encourage members of the field to develop new methods and use other methods they find appropriate,

I believe this is essential to enable us to expand our ability to better investigate, hypothesize and theorize about the object of inquiry to the field.

What is the role of the SD Society?



■ IF SD(M) Exists AND SD(F) ≠ Exist THEN



- Objective of SD Society should be to promote SD(M) until it becomes ubiquitous and the "raison de existence" of the Society should fade away.

■ IF SD(F) = Exist THEN the Society needs to:



- Formalize different terms for SD(F) and SD(M).
 - So long as both SD(F) and SD(M) share the same name, it is implicit that the field of SD(F) can not ever adopt other methods.
- Concretely define SD(F) and SD(M) independent of each other.
- Consider bi-furcation of the journal to provide peer review of articles describing the application of:
 - a) SD(M) to other fields, and
 - b) other methods to the field of SD(F).

16

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What does this imply as to the role of the Society.

Well, if we determine that there is no field of SD(F) then the role of the society should be to promote the method until it becomes so ubiquitous that the reason for the existence of the society goes away.

If on the other hand we are convinced that SD(F) does exist then the role of the society should be to

- 1) Formalize different terms for both SD(F) and SD(M). This is crucial as so long as they share the same name it is implicit that SD(F) can not adopt other methods.
- 2) Define both SD(F) and SD(M) independent of each other. In other words neither definition can make reference to the other.
- 3) Establish a process for evaluating the use of other methods in the field of SD(F).

This may require us to bifurcate the journal into providing separate coverage of the application of SD(M) to other fields and the application of other methods to SD(F).

Can we define $SD(M)$ independent of $SD(F)$?



"SD(M) is a method by how one can model process structures and analyze their behavior through the investigation of how resources flow, accumulate and interact in the system, over time, in dynamic interdependent feedback loops."

- $SD(M)$ as a method can now be applied to any field of study that wishes to study the:
 - inherent process structures, and
 - model the dynamics of how process systems operate under certain conditions, historical or projected.



17

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How then can we define $SD(M)$

I would offer the following definition:

"SD(M) is a method by how one can model process structures and analyze their behavior through the investigation of how resources flow, accumulate and interact in the system, over time, in dynamic interdependent feedback loops."

I would argue that $SD(M)$ as a method can now be applied to any field of study that wishes to study the:

- inherent process structures, and
- model the dynamics of how process systems operate under certain conditions, historical or projected.

Now some of you may wish to advance your own definitions of $SD(M)$ and I would encourage that provided that your definition:

- a) Uses a distinctly different term for $SD(M)$ that does not reference $SD(F)$.
- b) Provides an operational definition for $SD(M)$ that does not reference $SD(F)$. It must be field neutral.

Can we define $SD(F)$ independent of $SD(M)$?



- The quick answer is to claim that $SD(F)$ is the field of studying the dynamics of systems.
 - However it is too broad to claim that $SD(F)$ is the field of investigating system structures as it relates to their dynamic processes and performance.
 - One can claim that anything is a "system" and that everything is "dynamic". $SD(F)$ can not be a field of study if it attempts to lay claim to be the study of everything. That is best left to religion.
- What makes $SD(F)$ so unique that it qualifies as a field unto itself?
 - Does the possibility exist that $SD(F)$ is not particularly unique and does not qualify as a field?

$SD(F) \neq \text{Exist}$

- Is it possible the field already exists but under another name (AN)?

$SD(F) = SD(AN)$

18

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Can we define $SD(F)$ independent of $SD(M)$?

Defining $SD(M)$ was much easier by comparison.

We can not take the easy route of claiming the $SD(F)$ is the field of studying the dynamics of systems. That to me is attempting to lay claim to be the study of every thing, something that is best left to religion.

We really need to consider what makes $SD(F)$ so unique that it qualifies as a field unto itself.

This means we need to consider:

- a) That perhaps it is not particularly unique and it does not qualify as a field
- b) It is also possible that the field already exists, albeit under another name. For now lets call that possibility $SD(AN)$

Does SD(AN) Exist? Implications?



- The potential exists that perhaps the field is already established, albeit under another name (AN).
 - If SD(AN) does exist, in all likelihood it employs methods other than SD(M).
 - It is also possible that SD(AN) does not yet even use or may make only limited use of SD(M).
- Issues may serve to prevent current practitioners of both SD(F) and SD(AN) from agreeing that they are pursuing the same field of study.
 - Both sets of practitioners would have to agree to learn and employ the method(s) of the other,
 - One group may have to admit to giving up the name by which they currently use to refer to their field of study.
 - The inertia in the self-concept mental models held by the agents of each group may be too strong to overcome consolidated rationalization of the fields.



19

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If SD(AN) does exist, then it likely uses methods other than SD(M) and it may not yet use or may make only limited use of SD(M).

I will grant you that this is a very challenging question to consider for if SD(AN) does exist substantial issues may serve to prevent current practitioners of both SD(F) and SD(AN) from agreeing that they are pursuing the same field of study.

Both sets of practitioners would have to agree to learn and employ the method(s) of the other,

One group may have to admit to giving up the name by which they currently use to refer to their field of study.

The inertia in the self-concept mental models held by the agents of each group may be too strong to overcome consolidated rationalization of the fields.

At the 2004 Palermo conference there was a call for SD(F) to be considered as an applied science of strategy. This suggests one candidate for SD(AN). However I am concerned that that might prove to be too limiting in scope for what SD(F) can be.

What are the attributes of a field of study?



- **Object of Focus** - A field of study needs to have a focus of inquiry, an object or domain of investigation.
- **Properties & Theories** - Fields of study exist to investigate and understand a specific set of characteristics, attributes or properties of some object of inquiry so that theories can be postulated concerning their behavior.
- **Methods** - Fields of study in general use a multitude of tools and methods to investigate the properties in question.
 - The tools/methods do not define the field and quite often find applicability to other fields of inquiry.
 - Fields of study should be broader than the use of single tool and must remain open to the inclusion of new methods that demonstrate their utility to the investigation.
 - Practitioners typically name their profession from the field, not the tools employed.
- **Purpose** - The intent may be for pure science or it may be for applied science so that the properties, once revealed, can be exploited in some fashion for the purpose of creating value or synthesizing information.
 - One must be able to clearly state the purpose for why we investigate *this object* and *these properties* as only if we understand the intent can we evaluate the utility of the methods employed.

20

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To really get to the heart of the matter one needs to consider what are the attributes of fields of study and specifically scientific fields.

Here is what I would suggest should be the essential criteria

Object of Focus - A field of study needs to have a focus of inquiry, an object or domain of investigation.

Properties & Theories - Fields of study exist to investigate and understand a specific set of characteristics, attributes or properties of some object of inquiry so that theories can be postulated concerning their behavior.

Methods - Fields of study in general use a multitude of tools and methods to investigate the properties in question.

The tools/methods do not define the field and quite often find applicability to other fields of inquiry.

Fields of study should be broader than the use of single tool and must remain open to the inclusion of new methods that demonstrate their utility to the investigation.

Practitioners typically name their profession from the field, not the tools employed.

Purpose - The intent may be for pure science or it may be for applied science so that the properties, once revealed, can be exploited in some fashion for the purpose of creating value or synthesizing information.

Fundamentally, one must be able to clearly state the purpose for why we investigate *this object* and *these properties* as only if we understand the intent can we evaluate the utility of the methods employed.

Defining SD(F) :: Applications & Intent of SD(M)



- **What then is the object of inquiry and the set of properties that SD(F) purports to investigate? Why is this useful, what is the intent?**
- **How and where has SD(M) been applied?**
 - SD(M) has primarily been applied against the object of bounded systems (organizations) within their environment.
 - SD(M) is used to investigate and model the attributes and properties that involve the use, consumption and creation of resources (tangible and intangible) in process system structures.
- **Why has SD(M) been applied?**
 - Seek to understand how process system structures influence the behavior of the system.
 - Seek to anticipate how the organization may behave in the future, given these properties and the environment, so as to assess the sustainability of the system.
 - Seek to develop strategies to reallocate, add to and/or change the properties so as to effectively, and in a controlled fashion, adapt the future behavior of the process so that the system can remain viable, evolve and produce itself.
 - Seek to understand how systems emerge, self-organize, produce themselves, evolve and interact dynamically over time with their environment.

21

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What then is the object of inquiry and the set of properties that SD(F) purports to investigate? Why is this useful, what is the intent?

I think we can best consider this by investigating how, where and why SD(M) has been applied.

I would suggest that

SD(M) has primarily been applied against the object of bounded systems (organizations) within their environment.

SD(M) is used to investigate and model the attributes and properties that involve the use, consumption and creation of resources (tangible and intangible) in process system structures.

Why has SD(M) been applied?

Seek to understand how process system structures influence the behavior of the system. But that alone is not enough. Our focus is clearly more than just the connection between structure and behavior.

We also seek to anticipate how the organization may behave in the future, given these properties and the environment and thus develop strategies to reallocate, add to and/or change the properties so as to effectively, and in a controlled fashion, adapt the future behavior of the process so that the system can remain viable, evolve and produce itself.

Seek to understand how systems emerge, self-organize, produce themselves, evolve and interact dynamically over time with their environment. so as to assess and insure the sustainability of the system.

Now some of you may wish to expand upon this or perhaps even narrow xxxxx

Distilling down a definition for SD(F)



- SD(F) is the field of studying process system structures and how they use, consume and create resources (tangible and intangible) as they emerge, self-organize, change and interact dynamically over time with their environment.
- The intent of SD(F) is to assist the organization to understand these properties so that its past behavior can be explained and provide the means to anticipate future performance so that it can adapt to insure its sustainability.
- *SD(F) is the science of viability, emergence and sustainable dynamic adaptation of self-organizing systems.*



22

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Let's try to distill this down:

SD(F) is the field of studying process system structures and how they use, consume and create resources (tangible and intangible) as they emerge, self-organize, change and interact dynamically over time with their environment.

The intent of SD(F) is to assist the organization to understand these properties so that its past behavior can be explained and provide the means to anticipate future performance so that it can adapt to insure its sustainability.

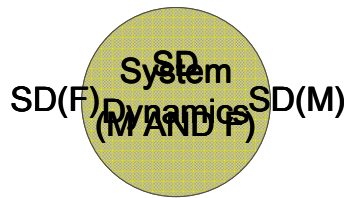
To simplify this even further I would say that:

SD(F) is the science of viable emergence and sustainable dynamic adaptation of self-organizing systems.

Independent Non Self-Referencing Definitions



- *“SD(M) is a method by how one can model process structures and analyze their behavior through the investigation of how resources flow, accumulate and interact in the system, over time, in dynamic interdependent feedback loops.”*
- *“SD(F) is the science of viability, emergence and sustainable dynamic adaptation of self-organizing systems.”*



23

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We have now arrived at independent non self-referencing definitions for SD(M) and SD(F).

We have different terms for each, at least in the abstract.

We have decoupled the method from the field and the paradox is broken. Both can now positioned separately and can evolve independently.

Methods and Theories Applicable to SD(F)



- What methods and theories are useful when endeavoring to investigate, understand and explain the properties of the *viable emergence and sustainable dynamic adaptation of self-organizing systems*?



- *Autonomous agent modeling* (Reynolds)
- *Chaos Theory* (Poincare, Godel, Cantor, Feigenbaum)
- *Complexity Theory* (Godel, Cook, Levin)
- *Dynamical Systems* (Poincare)
- *Emergence Theory* (Holland)
- *Fractal Geometry* (Mandelbrot)
- *Game Theory* (Nash)
- *General Systems Theory* (Bertalanffy, Ashby)
- *Information Theory* (Shannon/Wiener)
- *Integrated Systems Methodology* (Schwaninger)
- *Metric-Multidimensional Cognitive Modeling* (Woelfel, Barnett)
- *Neural Nets and genetic algorithms* (Holland)
- *Non-Monotonic Reasoning* (McCarthy, Reiter, McDermott and Doyle)
- *Requisite Variety Engineering* (Ashby)
- *Soft Systems Methodology* (Checkland)
- *SD(M)* (Forrester, et al)
- *Systems Thinking* (CLDs, System Archetypes) (Senge, Richmond, et al)
- *Team Syntegrity* (Beer/Fuller)
- *Viable System Modeling* (Beer)

- I would welcome the suggestion of other methods and theories.

24

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I would now propose an initial set of methods and theories that would be appropriate to the field of SD(F).

These are methods and theories that I have found useful when endeavoring to investigate, understand and explain the properties of the *viable emergence and sustainable dynamic adaptation of self-organizing systems*. I could not do my current job today without them.

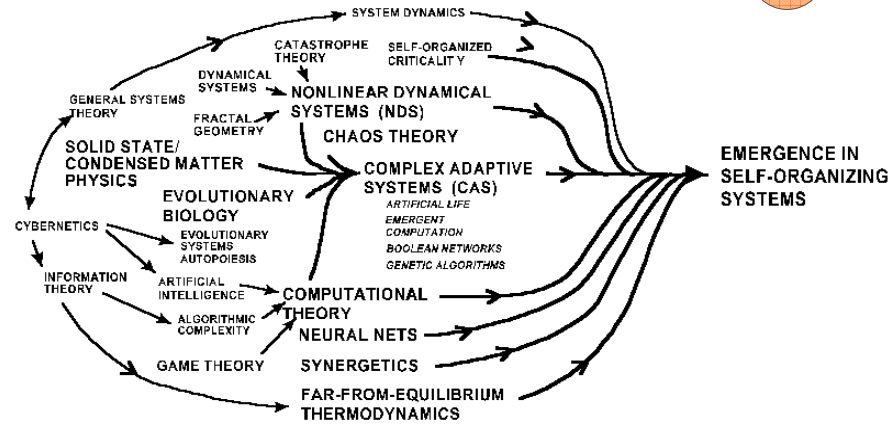
I would welcome the suggestion of other methods and theories.

However in preparing such a list one needs to consider the set of heuristics I have just laid out. It begs the question, does this set of tools overlap with or maybe even form the primary set of methods to another field?

In other words does SD(AN) exist?

Practitioners of the field of Organizational Cybernetics would quickly recognize most of these tools listed above. For the most part they are tools developed as an outgrowth of the evolution and splintering of the field of Cybernetics over the last 50 years.

Does SD(AN) Exist? Implications?



Goldstein, Bechtel, R. Richardson

25

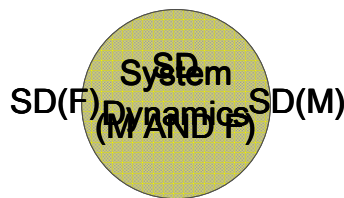
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Goldstein, Bechtel and R. Richardson have suggested that many of these methods that are now finally starting to come back together to be applied together.

Independent Non Self-Referencing Definitions



- *“SD(M) is a method by how one can model process structures and analyze their behavior through the investigation of how resources flow, accumulate and interact in the system, over time, in dynamic interdependent feedback loops.”*
 - *“SD(F) is the science of viability, emergence and sustainable dynamic adaptation of self-organizing systems.”*
- 1) Decouple the method from the field.
 - 2) Different terms for each.
 - 3) Non self-referencing definitions



26

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Now some of you may disagree with the definitions that I have arrived at. You may wish to expand, contract or change the scope of the definitions and I would encourage you to do so.

The intent of my paper is not to review and propose the best operational definitions for these terms, but rather to provide a dialectic approach that allows us to abstractly consider the method and the field as distinct concepts.

This enables us explore the utility of separating the two and develop a process for arriving at distinct operational definitions.

I propose this as I believe that the current self-referential entanglement between the method and the field by the System Dynamics community is untenable as it directly:

practitioners constrains the development and evolution of both SD(M) and SD(F) by its current

limits the acceptance rate by other fields to adopt SD(M), and

discourages discourse with others who might otherwise rationalize their study of SD(AN) as equivalent to the study of SD(F) and thus consider the utility of SD(M) in their work.

If we are to advance as a society and realize our strategic aims in advocating and evolving both SD(M) and SD(F) then we must mature past this self imposed boundary that constrains us and expand the solution set.



■ Thank you!

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