System Dynamics Society Strategy

Strategy Committee[1] Report for 2014

… for the Policy Council meeting: Feb 8, 2015

Summary

Key items of progress on strategy issues, and on the strategy process, in 2014:

- Approval and appointment of Vice President: Marketing & Communications – to increase awareness of the field, notably in real-world applications.
- Approval and appointment of Vice President: Professional Practice – to improve support for, and promotion of, system dynamics practitioners who were under-represented in the Society's activities.
- Delivery of the first Asia-Pacific region conference, plus support for smaller regional meetings in Italy, Brazil and Africa – to increase visibility outside of English-speaking regions.
- Progress on the Society's strategic plan itself was limited to a strategy discussion by the Policy Council at the Summer Society meeting (summarised in this report), and tentative early work on "models of the field". A link to the current version of the model is provided, and its causal-loop structure[2].

Priorities for strategic issues, and further strategy work, during 2015:

- Completing the review of options for the offering of professional certification for system dynamics practitioners.
- Establishing some form of market-place to match potential users/clients wanting SD-based support with practitioners capable of providing that support.
- Further development of the model for the field, including attention to the considerable data-gaps and identification of action levers to enhance the field's impact.

Policy Council discussion: Summer meeting

The Policy Council used much of its Summer meeting (20-July-2014: Delft) for a strategy discussion led by Prof George Richardson. Recognising limitations in the strategy analysis reported to the Feb 2014 Winter Meeting, the discussion was deliberately open-ended. Also, given the Society's focus on promotion of the system dynamics *field*, the debate addressed the wider context, not simply the Society itself.

Participants at the meeting were invited to list strengths and weaknesses of the field that might enhance or hinder its progress and impact, opportunities that might exist for its further development, and threats to that development. The results were summarised and clustered with the help of Etiënne Rouwette and Raafat Zaini, Matthew Bigman (Business SIG) – table 1. Full details are in Attachment 1.

Notable additions to the prior strategy include the potential strength in pre-college education {K-12]; weaknesses in the method's difficulty and limited learning opportunities for those wishing to learn its use; opportunities may exist in out-reach to other academic and practitioner communities, and threats arise from the increasing popularity and visibility of other methods.

[1] Jürgen Strohhecker (2015 President), Edward Andersen (2014 President), Etiënne Rouwette (2016 President), Kim Warren, Jim Lyneis, Erling Moxnes.

[2] With thanks to Fred Kautz for this analysis.

Table 1: Strengths, Weaknesses, Opportunities and Threats from the Summer 2015 PC meeting

Strengths	Weaknesses
1. Strong, well-defined method 2. Can handle big, dynamic complexity 3. Applicable to wide range of issues and fields 4. Strong, accumulated knowledge 5. Wide range of great successes 6. Strong core of skilled practitioners 7. Good K-12 material and interest	1. Hard to learn 2. Limited places to learn 3. Hard to communicate 4. Contribution not visible 5. Too few good practitioners 6. Hard to build experience 7. Lack of diversity and dissent
Opportunities	**Threats**
1. Increase visibility of applications 2. Untapped potential demand 3. Increased publishing 4. Appeals to next generation 5. Public awareness of big policy issues 6. Outreach to other, related communities	1. Rivalry from other popular methods 2. Miscommunication of SD and its impact 3. Demand for simple solutions 4. Limited capacity 5. Academic recognition 6. Poor delivery

Model[s] of the field

It has been suggested over many years, both at PC meetings and in other discussions among Society members, that a model of how the field works and performs would be a useful tool for developing the Society's strategy. The Summer meeting also considered initial working models of professional fields by Jack Homer and George Richardson.

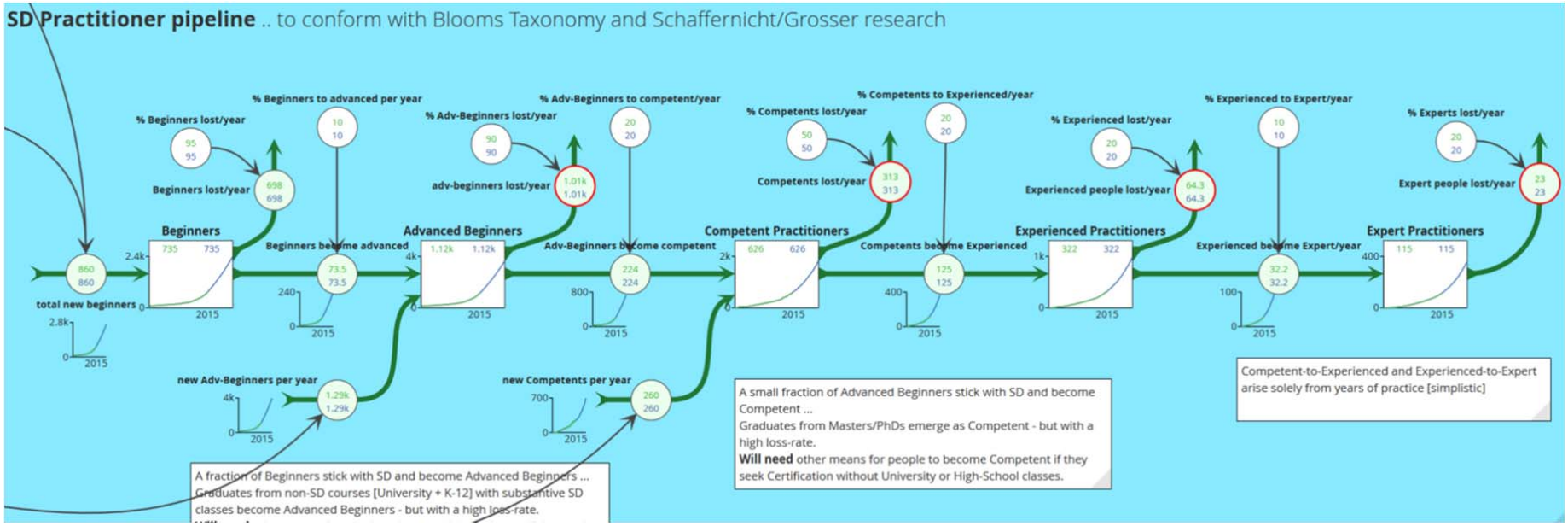
It was concluded that this task falls naturally into the remit of the Strategy Committee, who were asked by the President to take it on. A crude outline structure for such a model was developed in 2012 as the basis for the Strategy Committee report to the Policy Council. This has since been extended, but remains very much work-in-progress.

Not only is there potential for wide-ranging views regarding the importance and behaviour of different sectors of the field, there is an almost complete lack of information regarding all of those sectors – with the exception of the Society's membership. Nevertheless, Policy Council members are welcome to view the model's current status and provide feedback and guidance; see **http://sdl.re/SDfield** (requires any latest-version browser). The model runs from 1980 to 2030, and values displayed are for 2015, but ***all values are illustrative***, and not all mechanisms in the model have been completed. Those more comfortable with qualitative causal-loop diagrams may find the CLD-representation of the model's structure in Attachment 2.

Following is a summary of the model's main sectors …

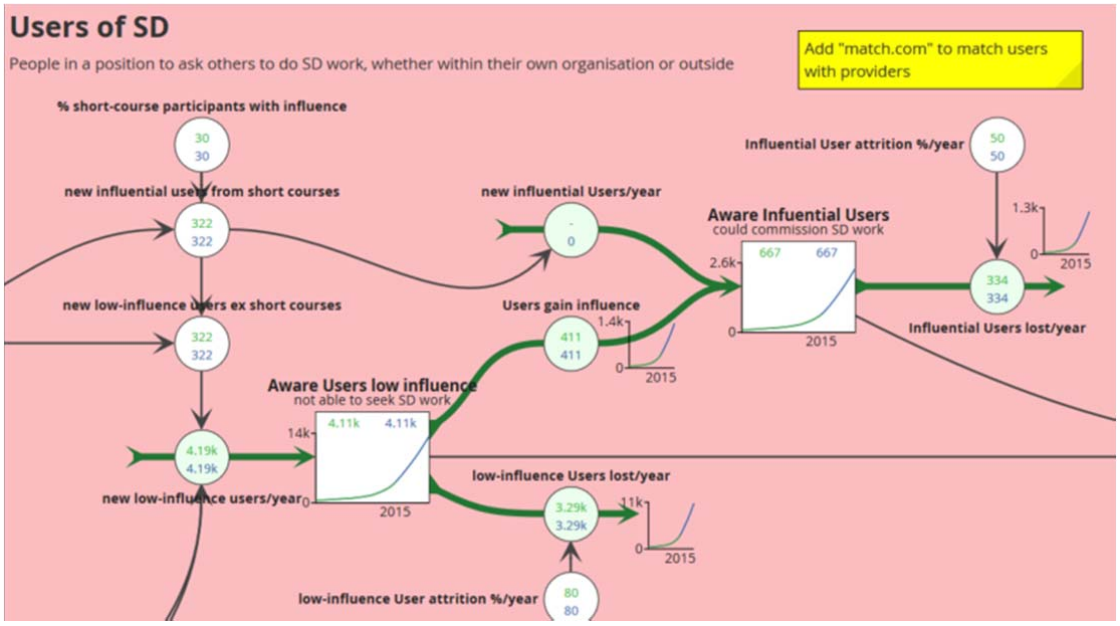
System dynamics practitioners are central to the field's impact through the work they do (figure 1). Codifying that practitioner pipeline has been much assisted by work on the of practitioner expertise carried out by Martin Schaffernicht and Stefan Grosser, following the recognised "Bloom's taxonomy". It is key to the field's development that practitioners are brought into that pipeline, develop through to the stages at which sound work can be performed, and are retained.

Figure 1: The practitioner pipeline



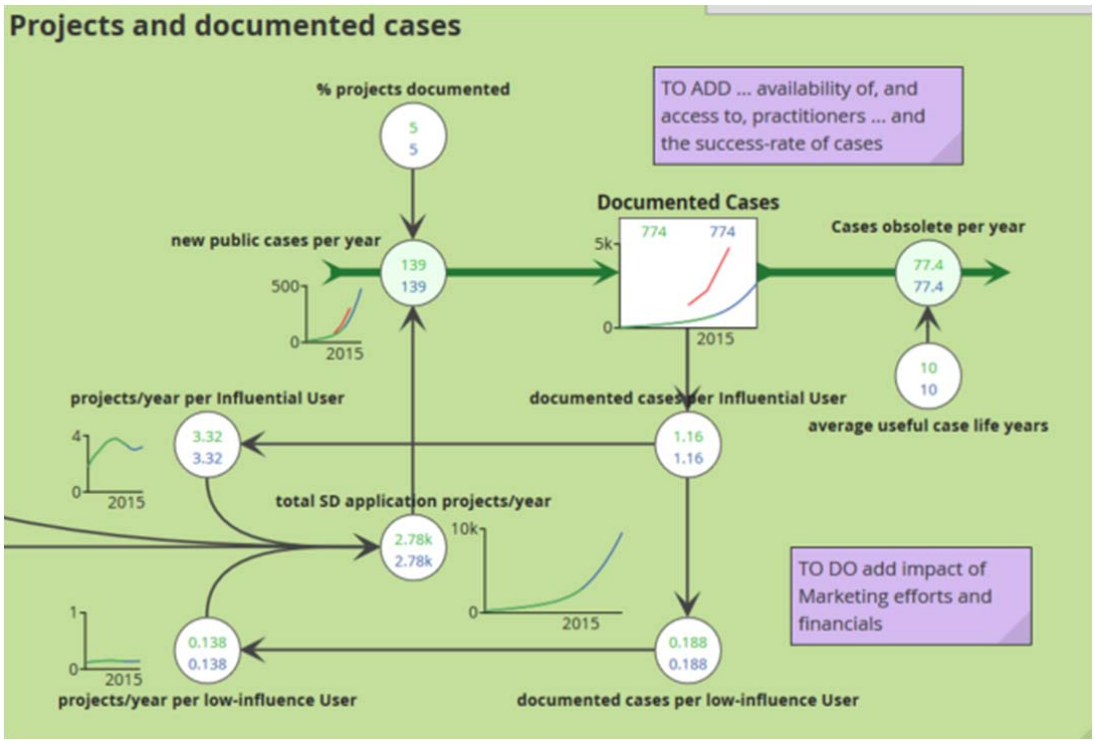
Impactful SD work will only happen if a population of **interested Users** exists- individuals who want such work to be done, and are in a position to request and fund it. Such awareness and interest requires sufficient exposure to the method to understand what it can do, which may arise from observing or reading about completed cases, supported in some cases by attendance on short courses.

Figure 2: Growth of potential users of SD work



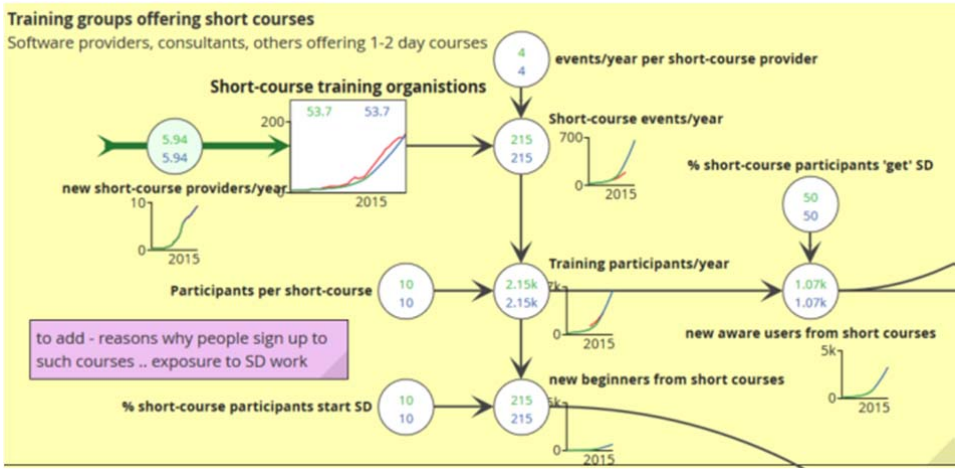
Informed users of SD have **SD-based projects** carried out (*assuming they can find the practitioners to do them*), a fraction of which are publicly **documented** (figure 3).

Figure 3: Projects carried out and documented.



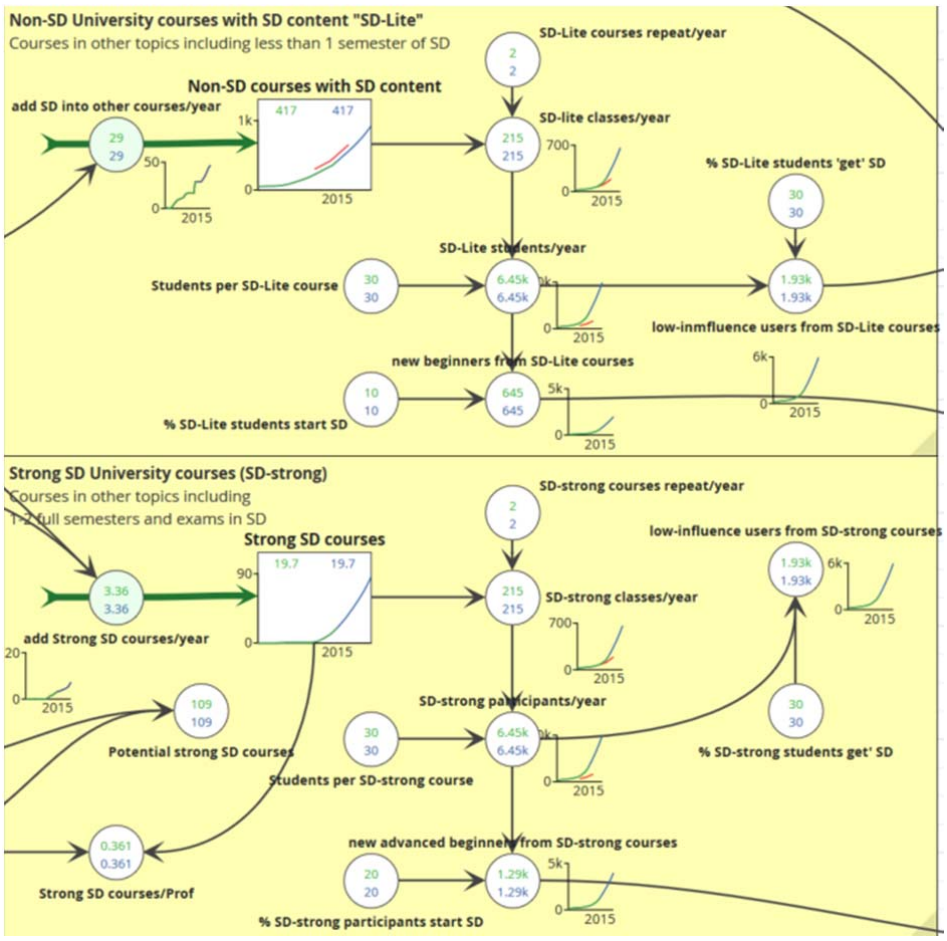
New potential users arise from attendance at short, **executive-oriented training.** *To be added* – other means to create potential users, such as direct on-the-job exposure to existing SD work or consultants.

Figure 4: Short-courses and SD-content in other programs creates interested users



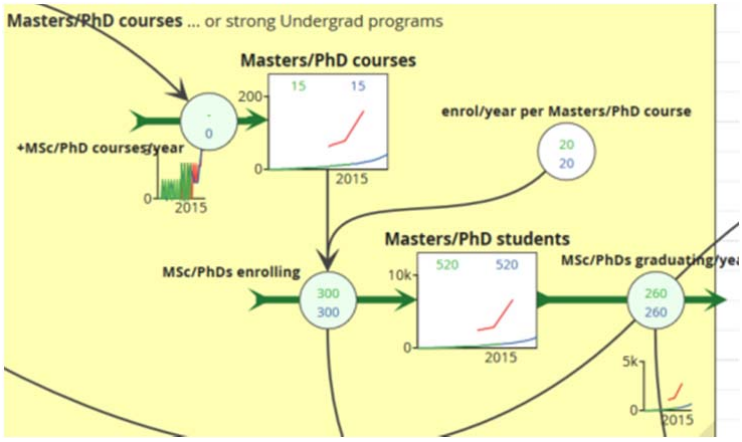
SD elements are offered in degree courses in other topics, such as Operations Research and Systems Engineering, so it is likely that other potential users arise from exposure to **SD as part of other degree programs** – characterised as "SD-Lite" (figure 4). **creates Beginner-level practitioners**, and more extensive, examined SD classes in non-SD programs (figure 5) **create Advanced-Beginner practitioners**. It is also known that many current **expert practitioners** originally joined the field through such classes.

Figure 5: SD-Lite classes and substantive SD classes create Beginners and Advanced Beginners



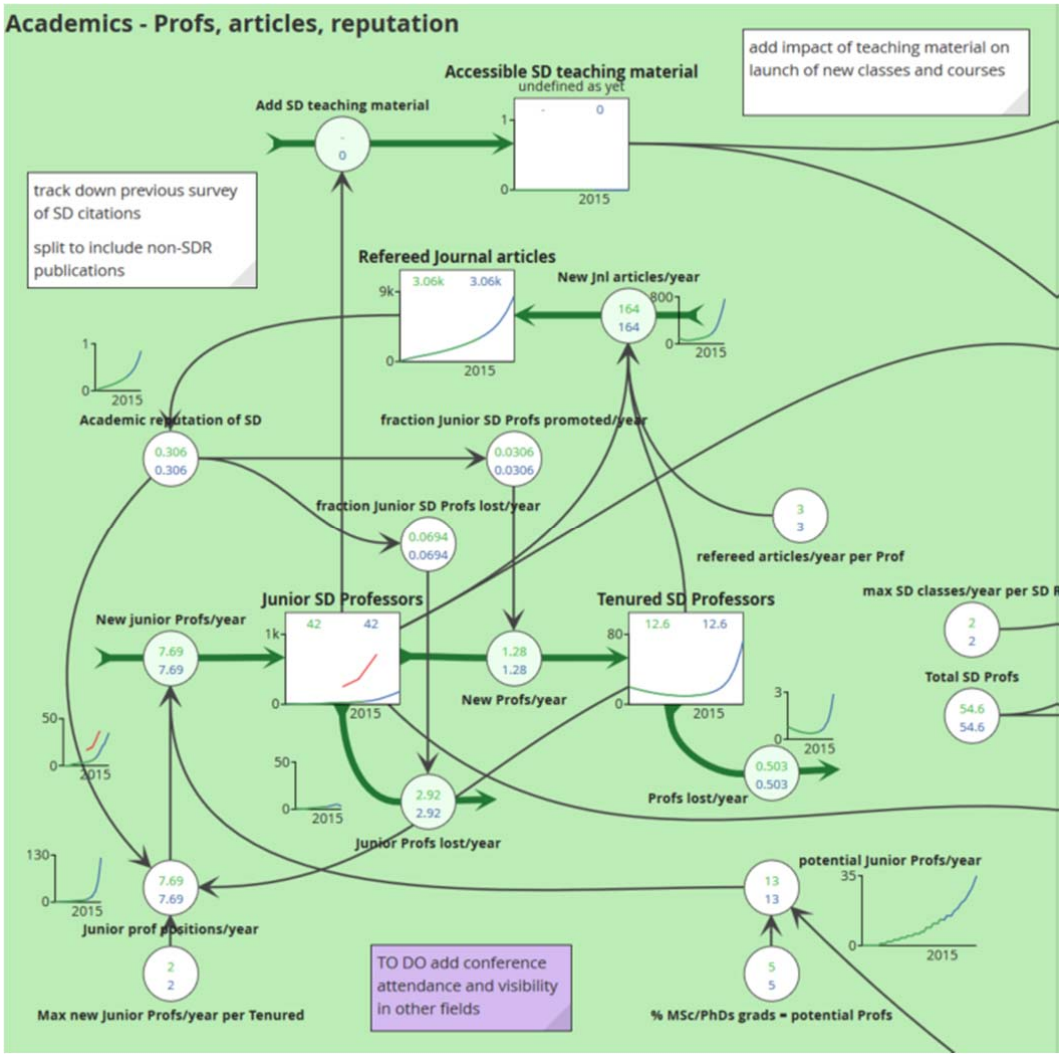
Competent practitioners are created directly by Masters/PhD courses, launched and run by University Profs (figure 6)

Figure 6: MSc/PhD courses create competent practitioners



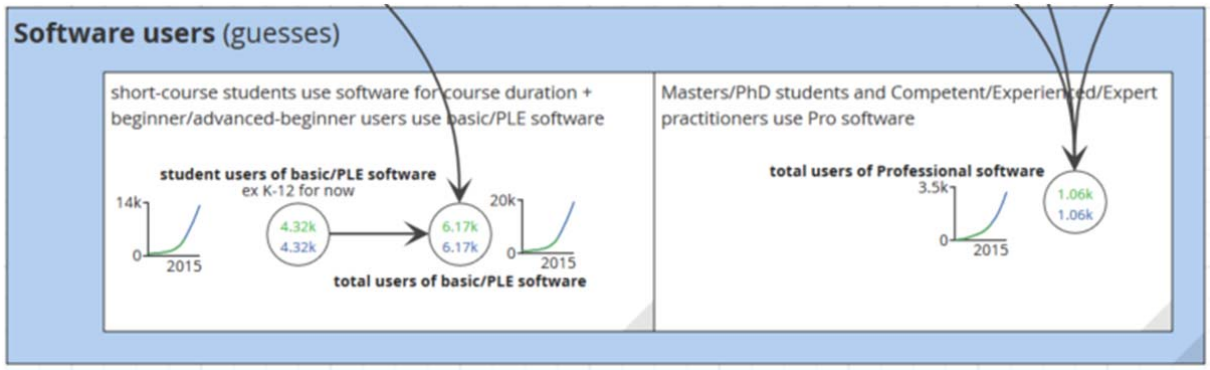
Junior SD-oriented faculty are appointed if there are enough PhD graduates, and enough SD academic jobs. Juniors are promoted to **Tenured Profs** if SD has a strong **academic reputation**, which depends on a strong stream of **refereed publications** (figure 7)

Figure 7: Academic jobs, tenure, publications and academic reputation



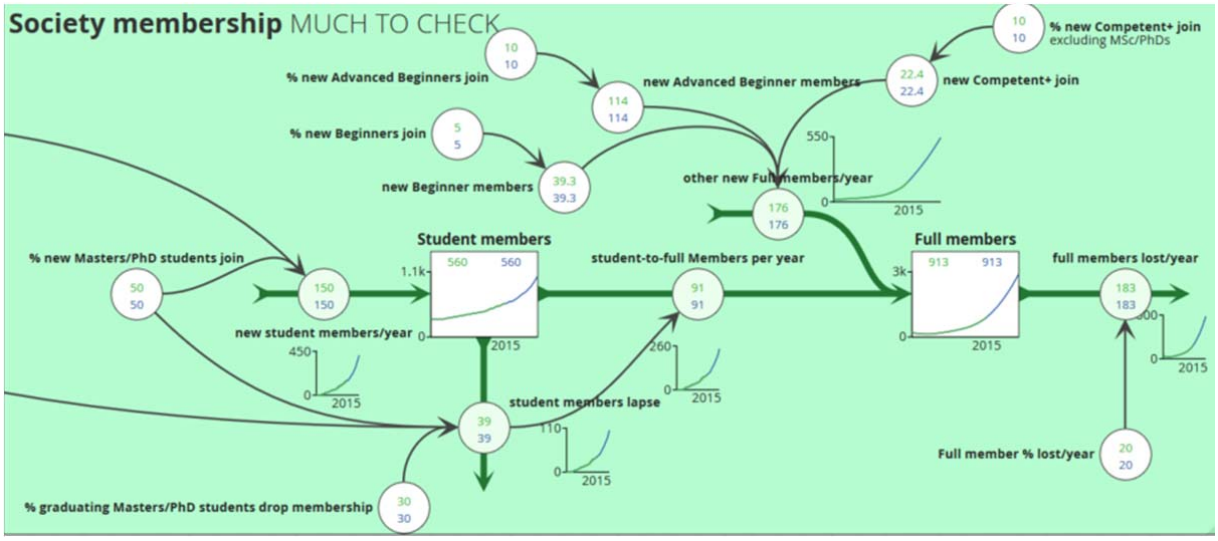
Since all SD practitioners *must* be using some form of simulation software, the **user-base for entry-level software** probably reflects numbers of Beginner and Advanced Beginner practitioners, and the **user-based for pro-level software** is driven by numbers of Competent, Experienced and Expert practitioners (figure 8).

Figure 8: Software users



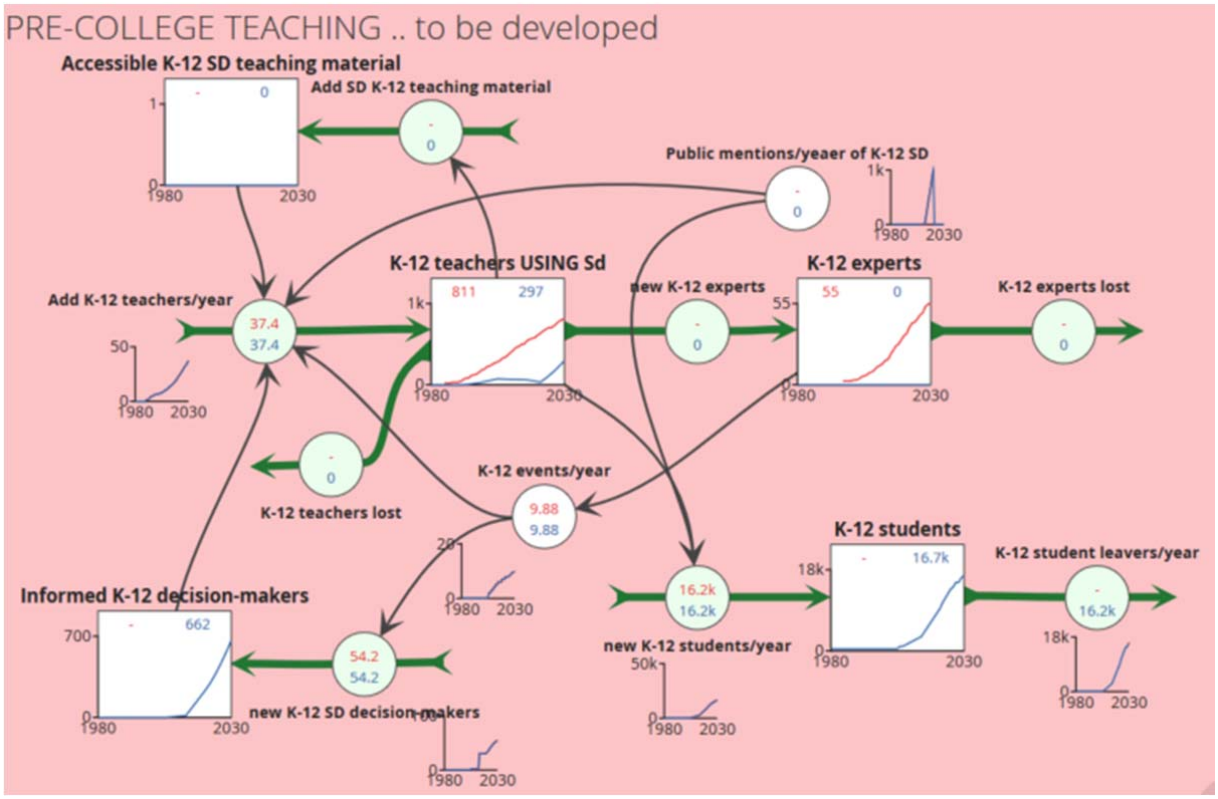
Society membership (students) is likely drawn mostly from current populations of MSc/PhD students, a fraction of whom continue membership on graduation. **Full members** are joined by new practitioners from other sources (figure 9).

Figure 9: Society membership.



Pre-college (K-12) teaching depends on numbers of **SD-trained teachers**, led by relevant experts. Pre-college classes generate SD-educated students, who join the Beginner or Advanced-Beginner groups of practitioners (figure 10).

Figure 10: Pre-college education



Attachment 1: full SWOT items list, grouped, from Summer 2014 meeting.

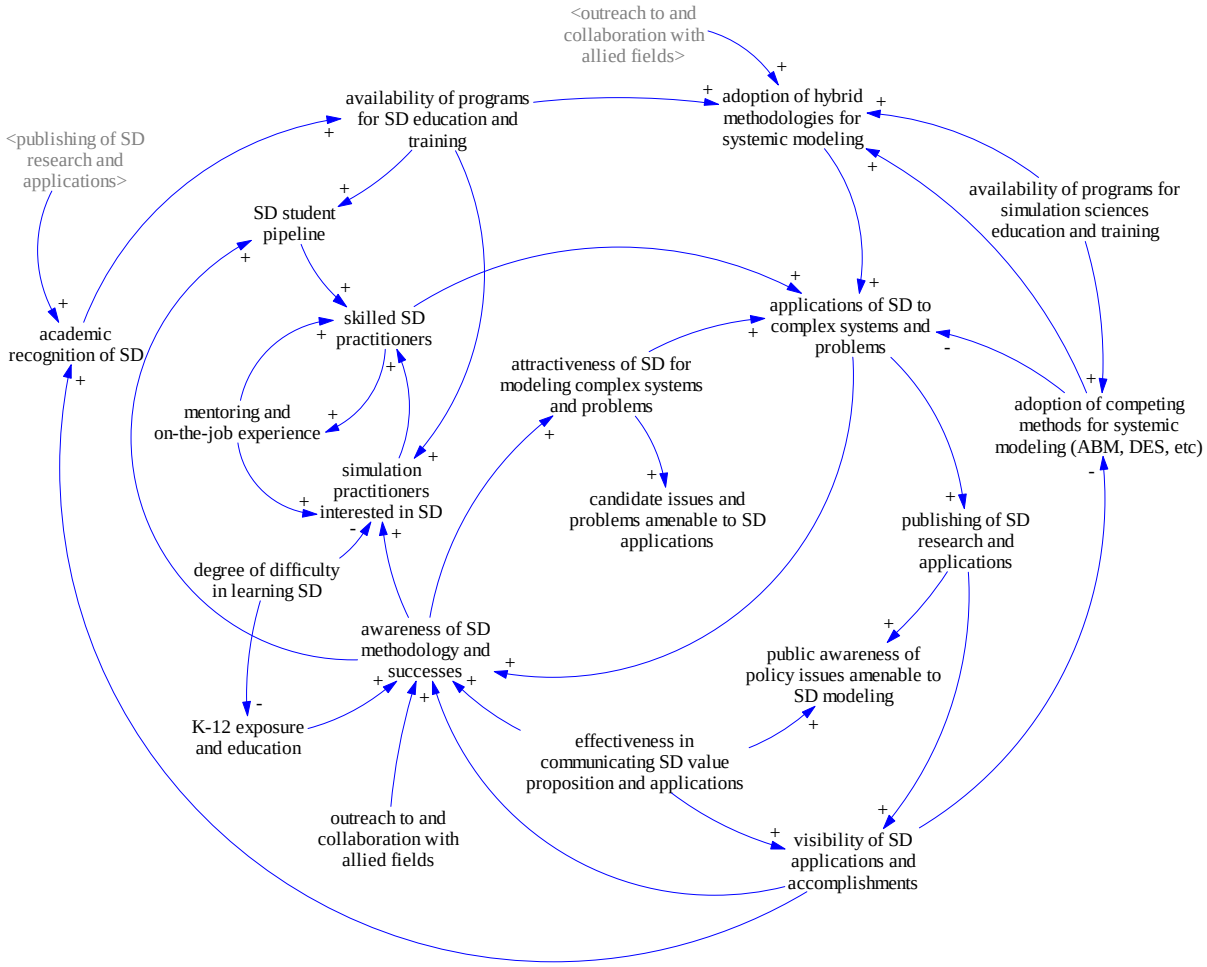
Strengths	Weaknesses
1. METHOD: structured method for model building … well defined methodology … methodology is strong … clarity of method … clarity and rigor of modeling … SD is a fascinating method 2. COMPLEXITY: powerful method for complex issues … method is powerful … deal with complex issues … dynamic perspective 3. APPLICATIONS: wide application opportunities across many domains … we impress people by thinking big … broad application across discipline … wide range of work, interdisciplinary included … 4. KNOWLEDGE cumulative knowledge … strong body of knowledge … 5. VALUE: easy to demonstrate value on a case basis … we have legitimate success stories … great work 6. PRACTITIONERS: current practitioners believe strongly … core of committed practitioners ... capable experts at top of field … friendly, open minded, supportive community 7. SD offers process research view 8. special niche to apply SD 9. substantial K-12 experience	1. LEARNING: hard to learn fully … lack of understanding that is not easy to learn … long time to learn 2. TEACHING: limited places to learn … SD is not taught at most top tier schools … educational capacity quality/scope 3. COMMUNICATION: methodology hard to explain … over complex and abstract presentation … ability to communicate about system dynamics … in a world of static thinking, a dynamic language is hard to understand … communication bridges not complete enough … resistance to modern communication tools (social media, video streaming of events) … methodology not well articulated (eg.: no PMBook) 4. CAPACITY: few existing high quality practitioners … quality hard to distinguish … hard to do well … practitioner time constraints evidence gathered " get to the model" … practitioners like basic "SD" idea and expect quick fix but method is complex 5. EXPERIENCE: limited availability of professional mentorship … newcomers need professional guidance … long time to become professional /apprenticeship to build experience 6. CULTURE: homogeneity of practitioners … lack of diversity … cult like culture … too much attachment to what the leaders of the field do … dissent is not encouraged to avoid creating rifts which inhibits healthy exchange of views and spreads complacency 7. ACADEMIA: discipline recognition … its hard to perform in a new domain … recruiting academic … lack of multiple SD journals with different focus … fragmented over various fields 8. RECOGNITION: need to sell SD in each article… lack of recognition, demand, use … branding … hidden excellent work " proprietary" … hard to get job as SDist

… continued …

Opportunities	Threats
1. VISIBILITY: branding … more awareness of complex problems … loads of proven successes to share 2. POTENTIAL: plenty of need for solutions … untapped diffusion potential … untapped potential 3. VISIBILITY: more help for people who want to publish … encouragement of practitioners to publish their work … emphasize value by SD 4. NEXT GENERATION: ability to lay groundwork in K-12 … students often are fascinated by the method 5. DEMAND: SD can illuminate problems that other fields can't … public awareness of global issues … business schools available to adopt … ability to engage people (all ages) in policy … policy relevance 6. BREADTH: topic area focus … cross fertilization between domains 7. OUTREACH: complex systems expansion … partnering with other groups/societies … recognition of interdisciplinary research (H2020-EU) … collaboration with other disciplines (e.g: economists and social scientists) … interdisciplinary approach (SD, ABM, SNA) 8. simulation supported approach 9. alignment with process research trends 10. small overlap between country chapter members and society members	1. RIVALS: SD is no longer taught at major universities … usurpation of society's intellectual role … existing techniques e.g. statistical seem to perform well enough … academically established fields e.g. economics performing well enough … being part of / overpowered by OR as a whole operation research … Agent Based approach becoming popular to complex problems … too quick to criticize non SD methods … general interest in complex systems and methods declines 2. MISCOMMUNICATION: ill informed talkers … bad Public Relation … dark system dynamics outside society 3. EXPECTATIONS: people want easy solutions … students are hesitant to do their work on SD / with SD -> too difficult 4. CAPABILITY: attrition of practitioners at different levels of experience … loss of capacity … too easy to produce poor work (consumers could be easily fooled) … SD … by non Society groups 5. DELIVERY: difficulty of methodology … not easy to know if work is good .... limited capacity for professional guidance /apprenticeship

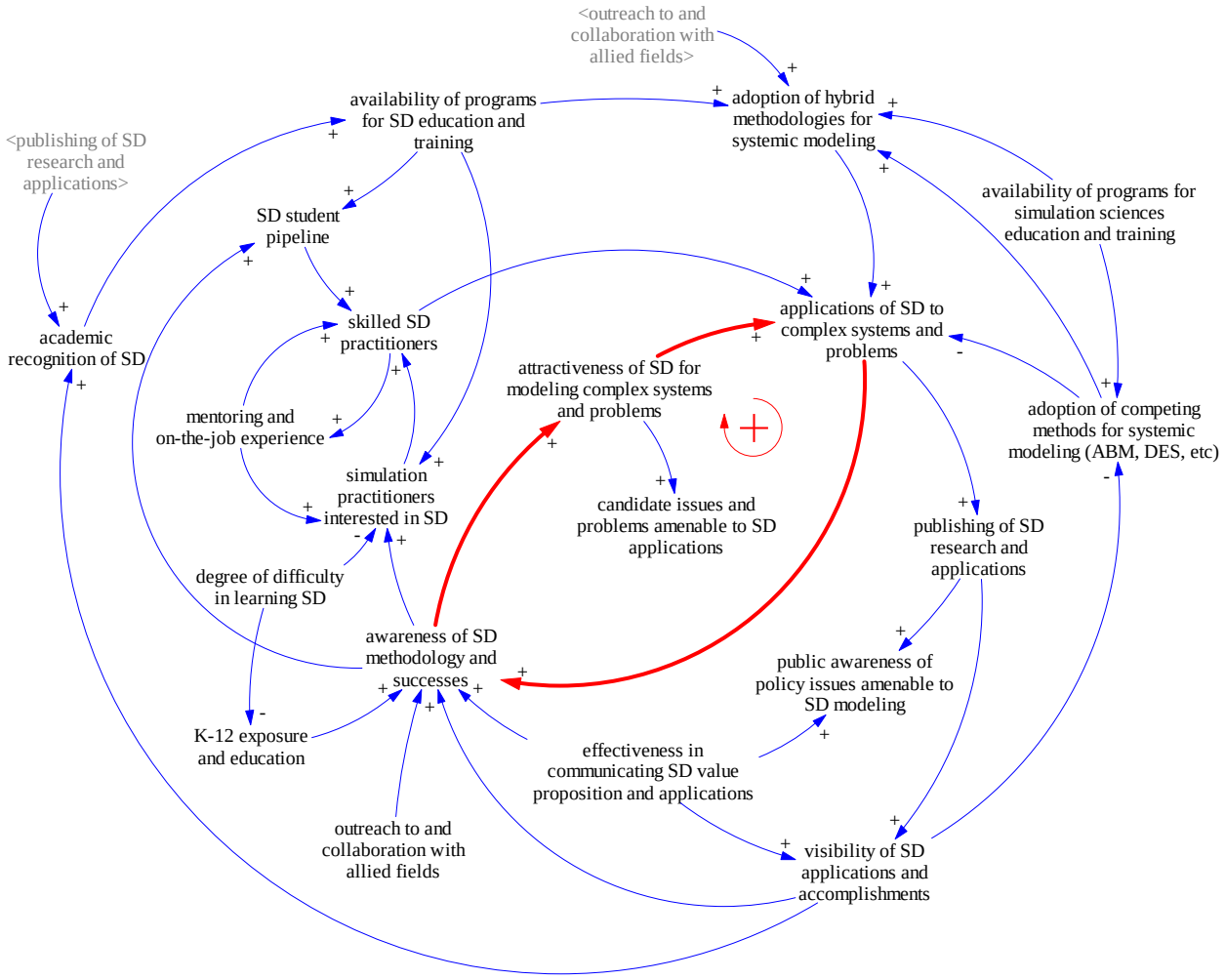
Attachment 2: Causal-Loop Diagram for the Field of System Dynamics

The following diagram summarises the main feedback structures in the model.



See following pages that highlight the main loops in this structure ..

Loop A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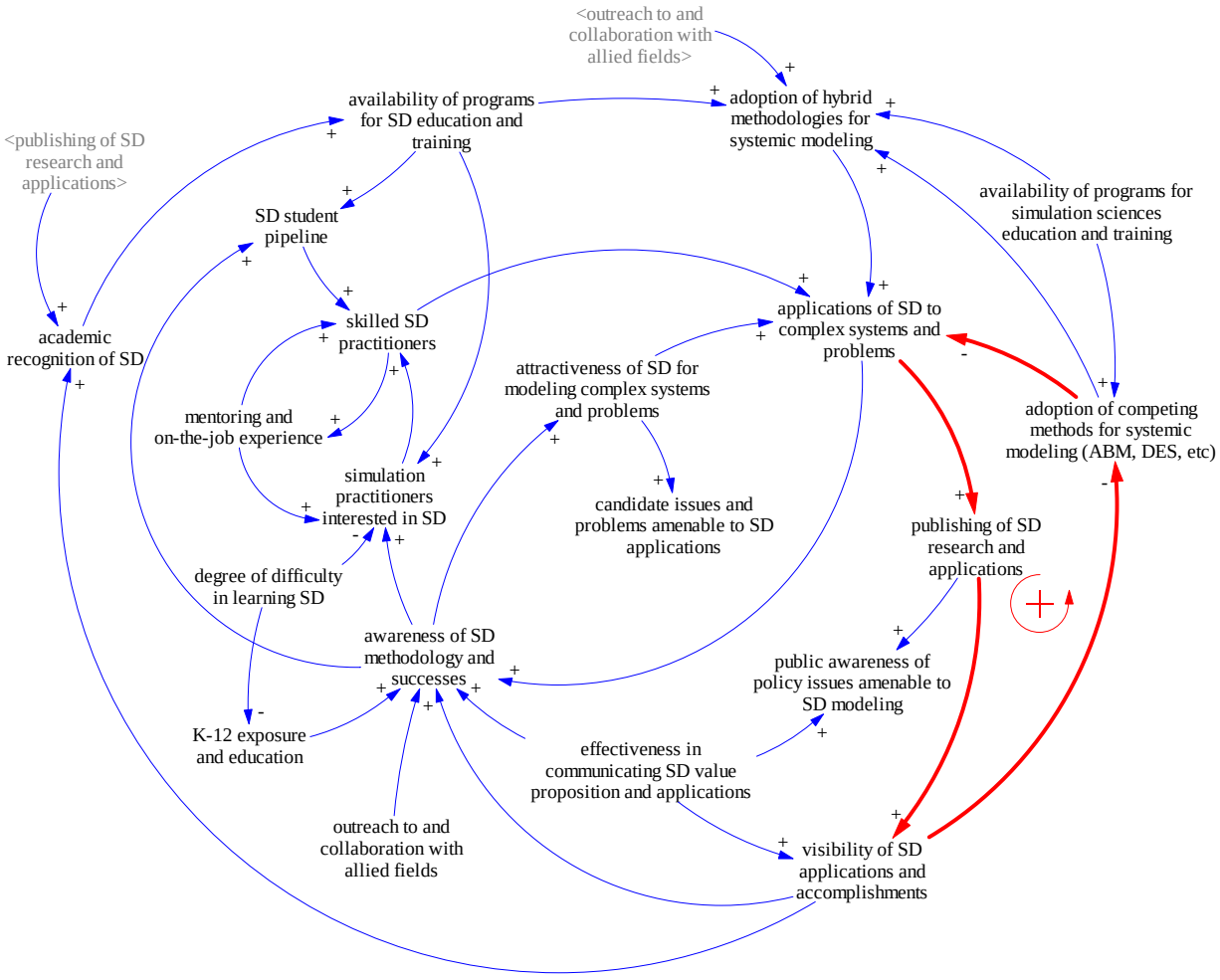
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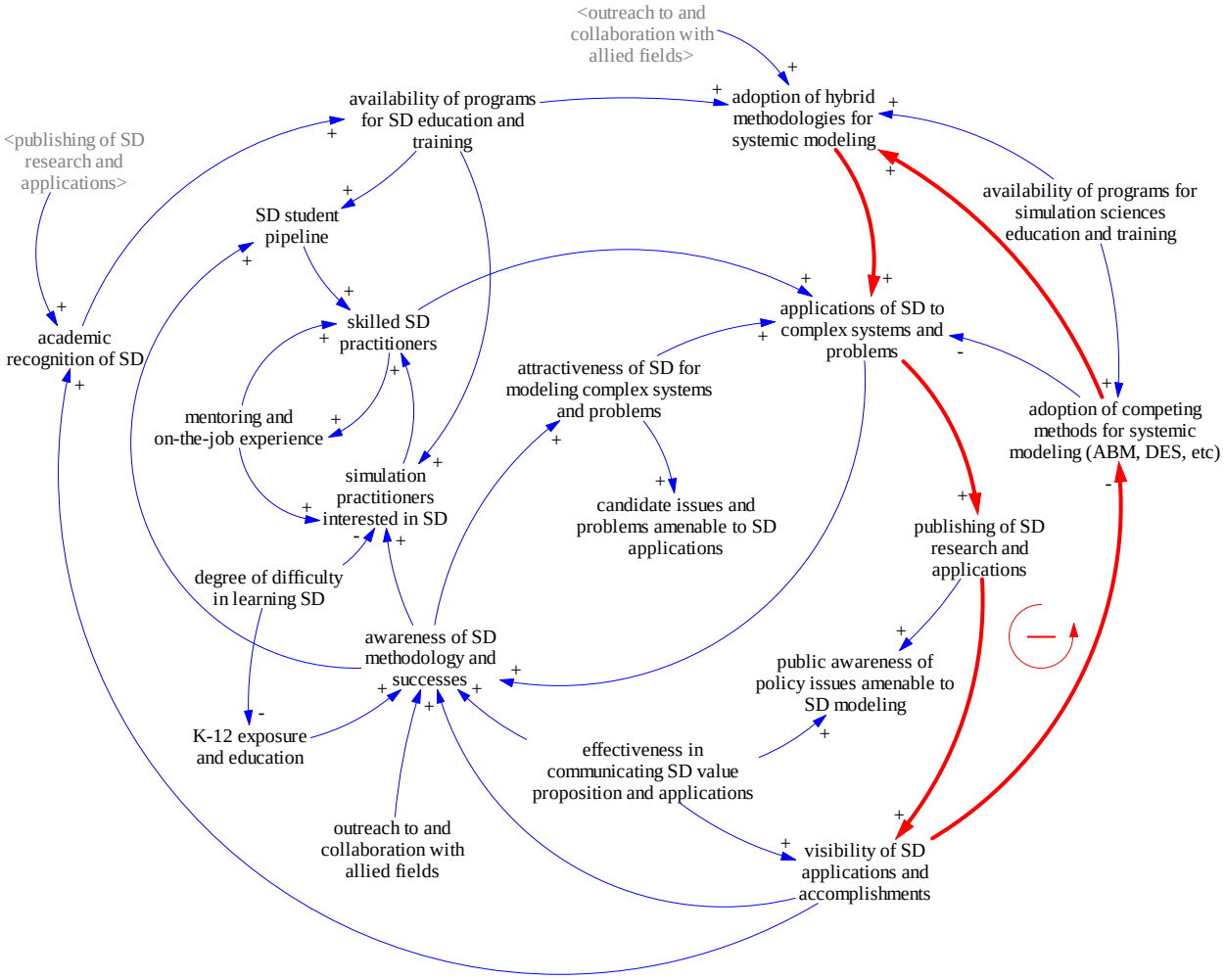
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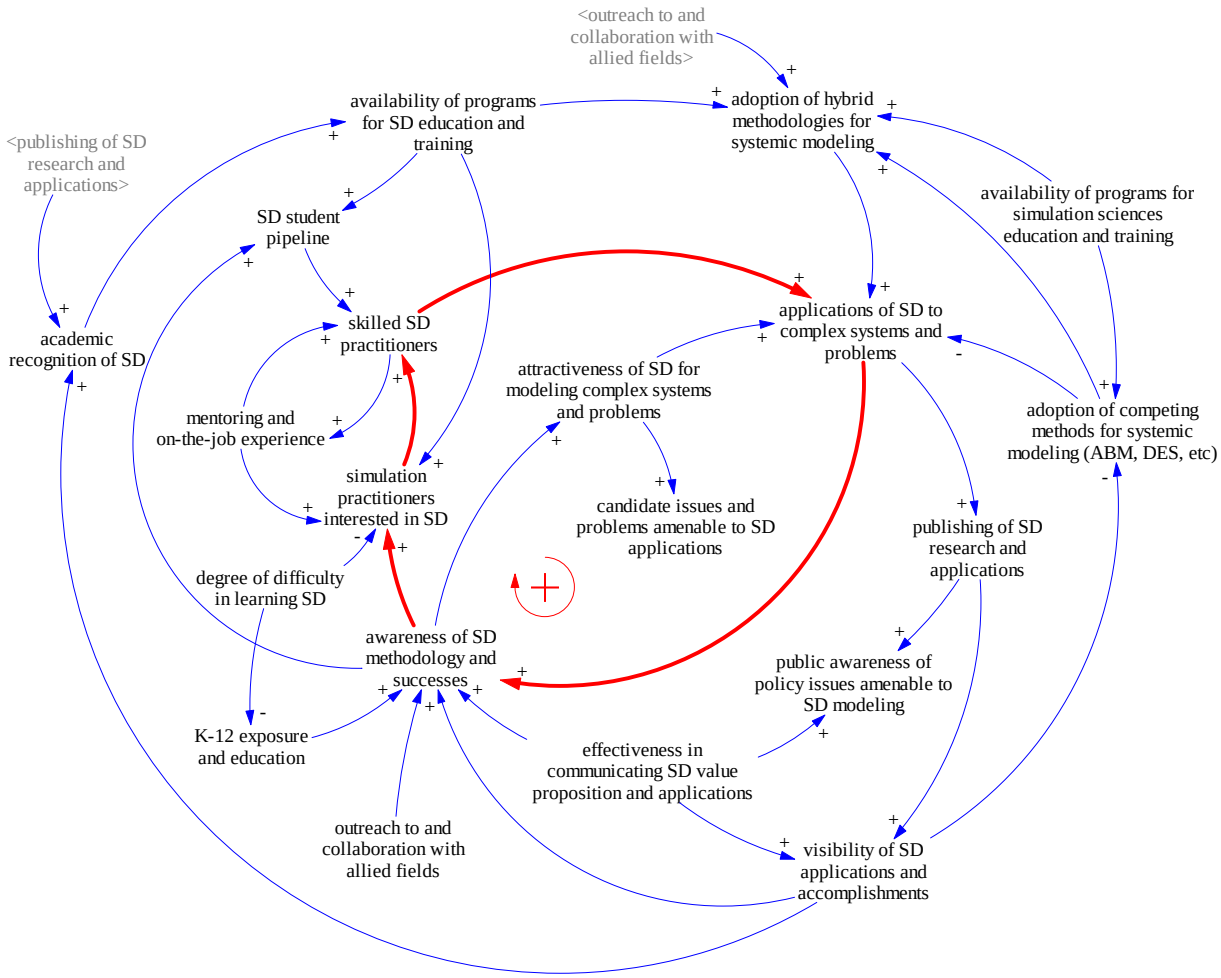
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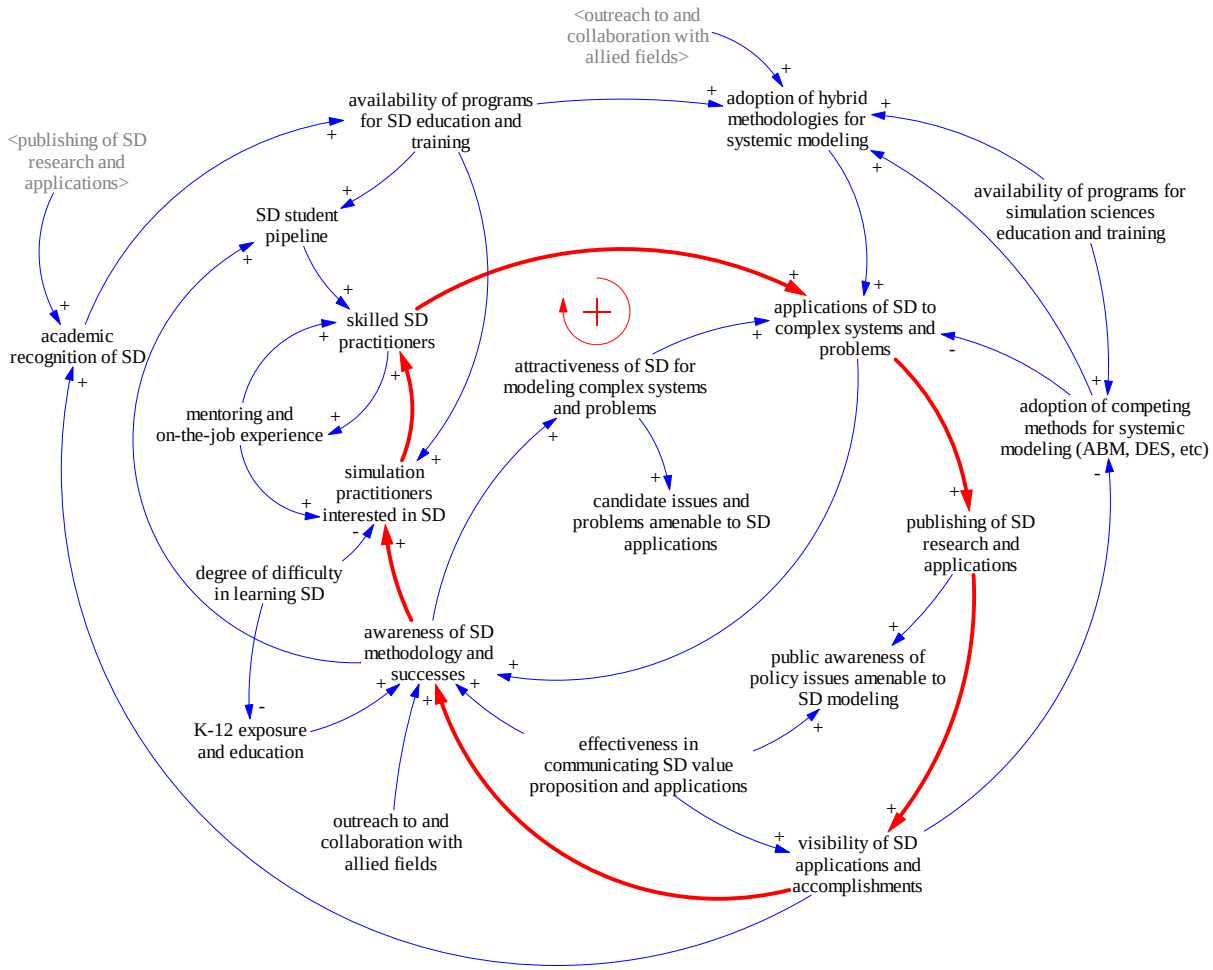
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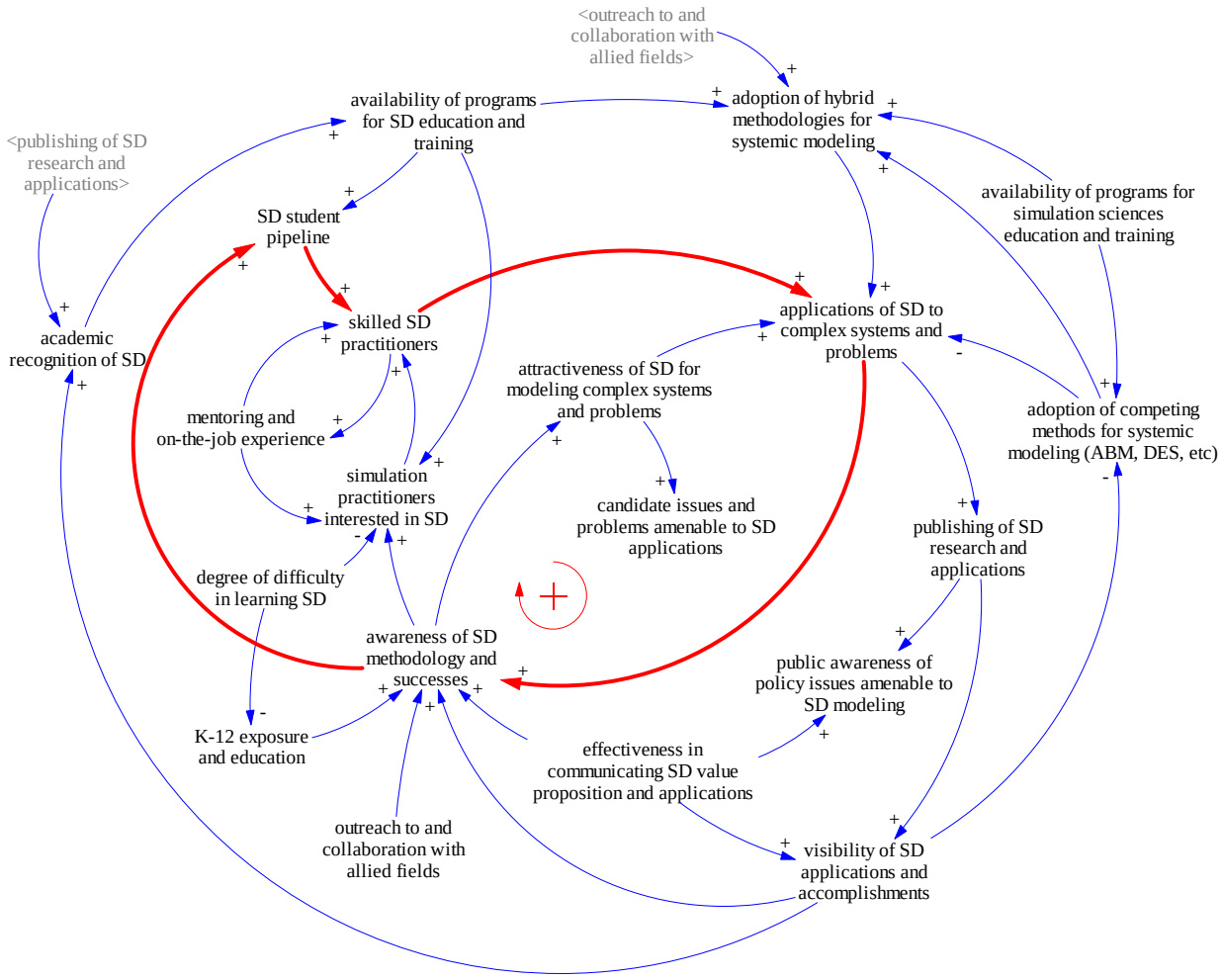
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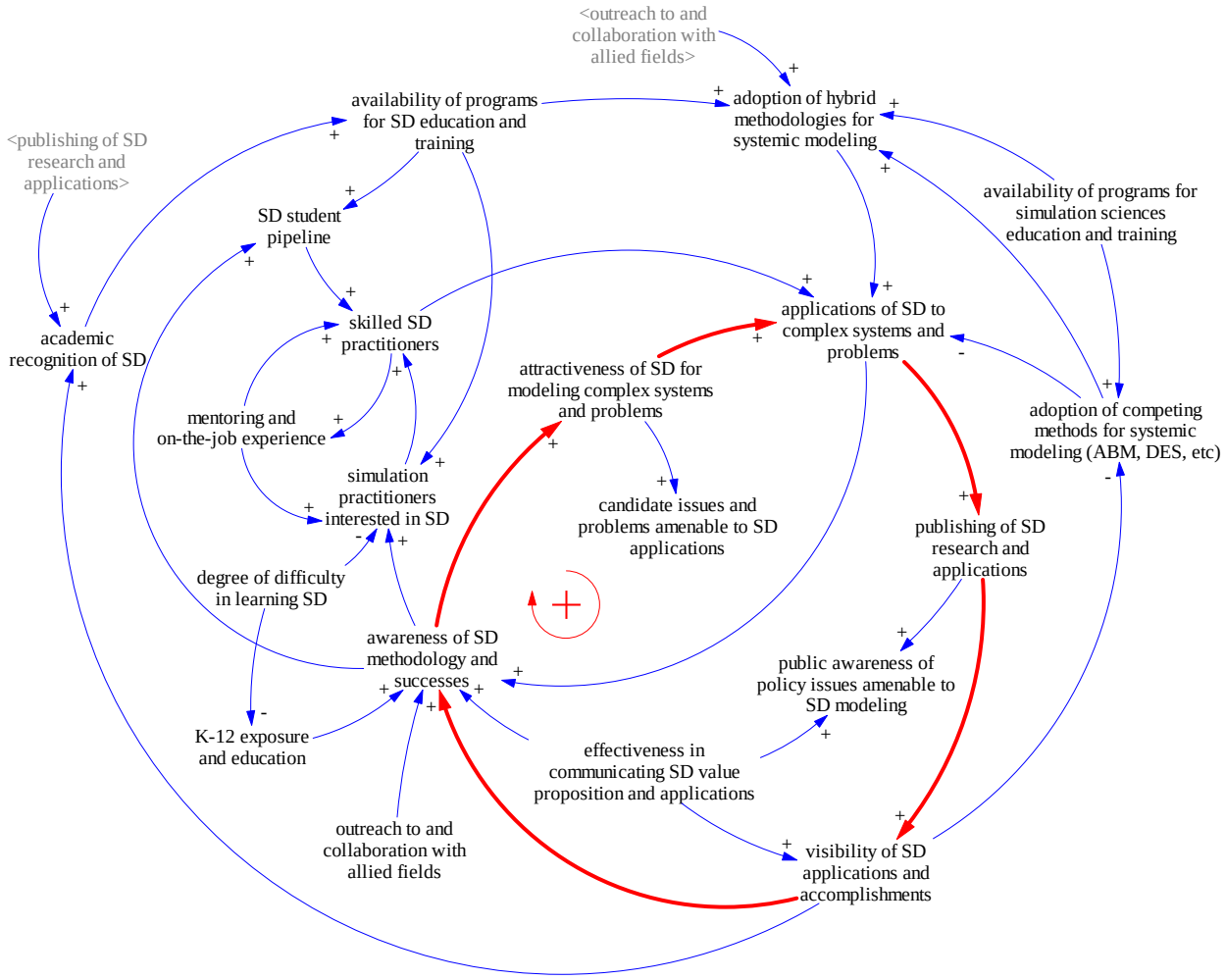
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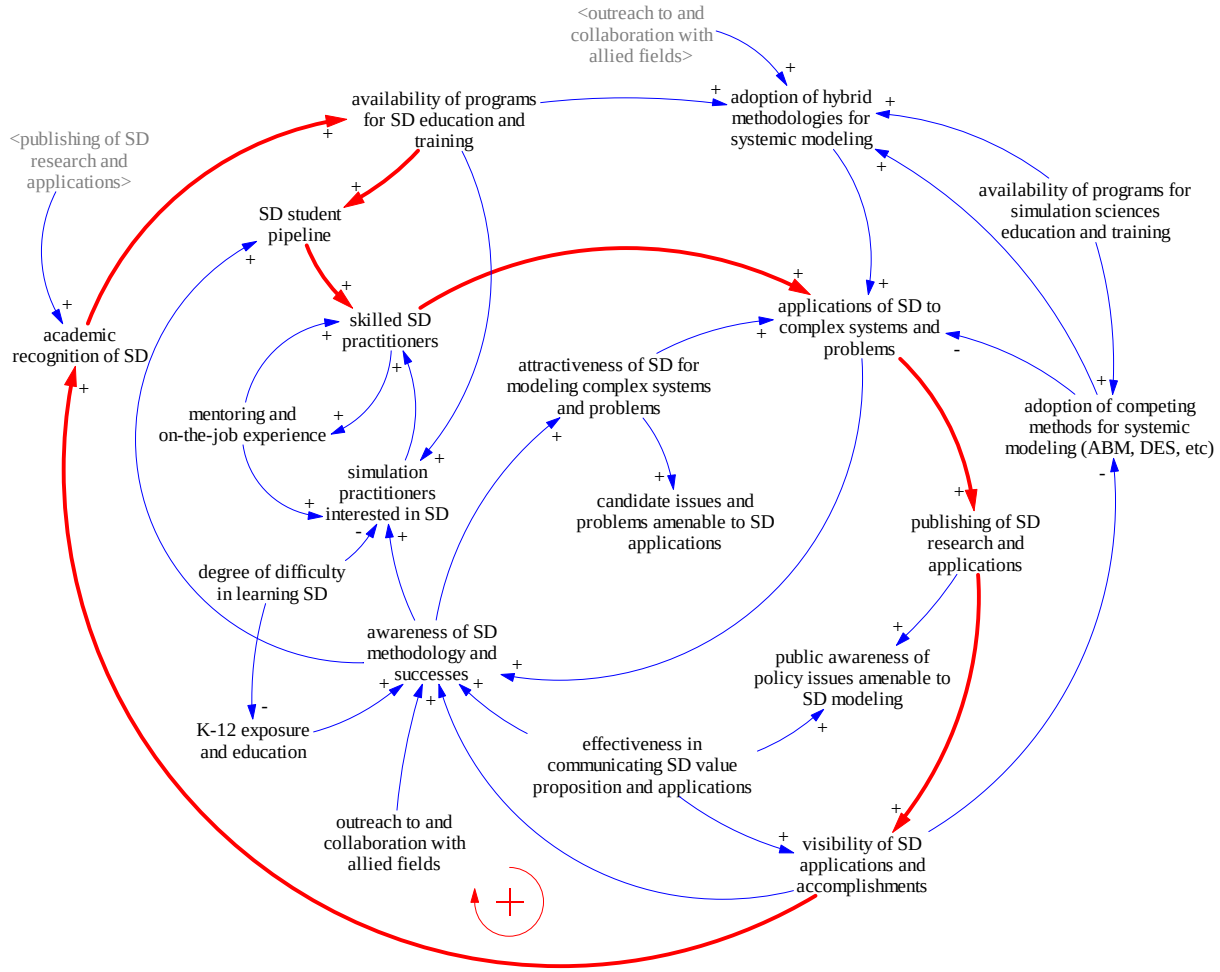
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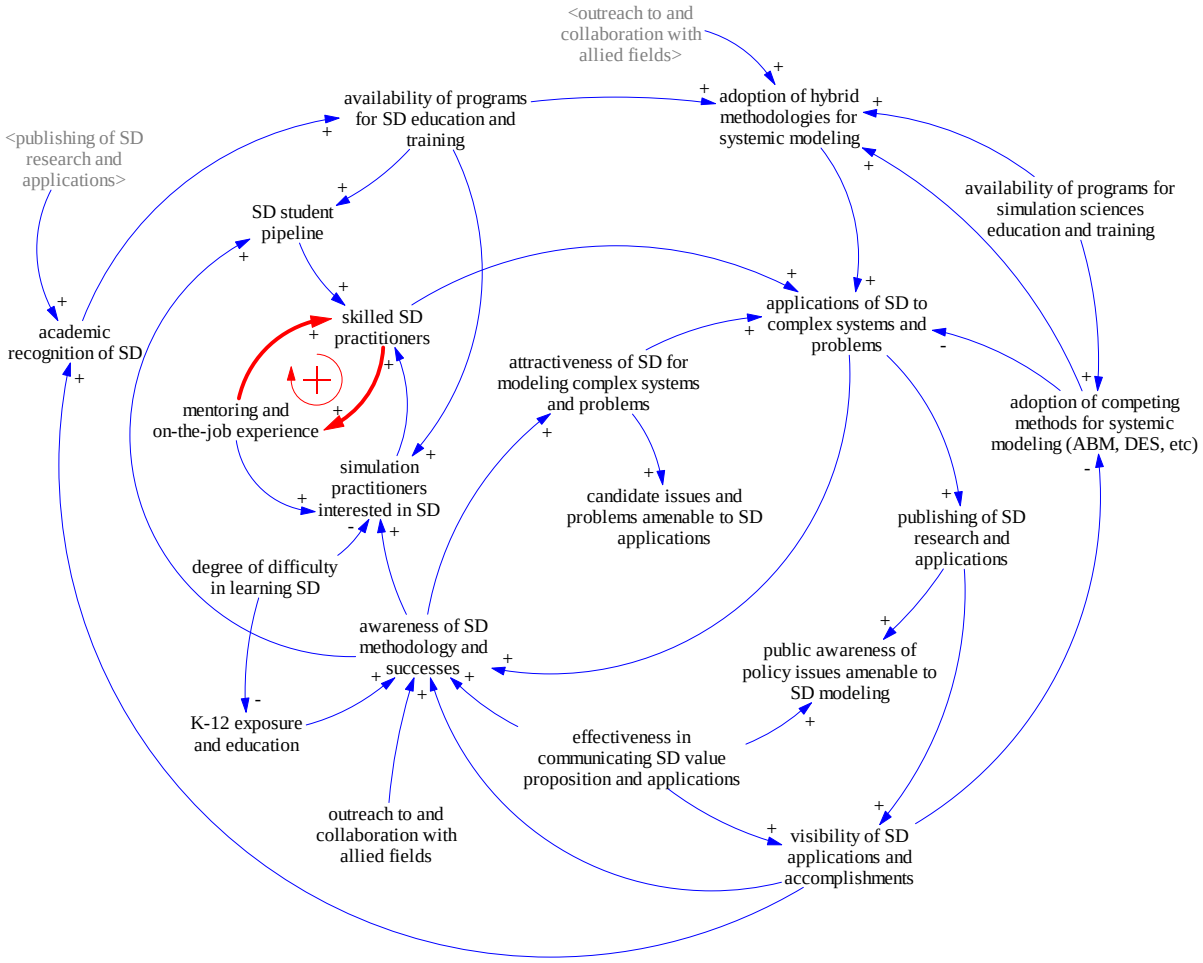
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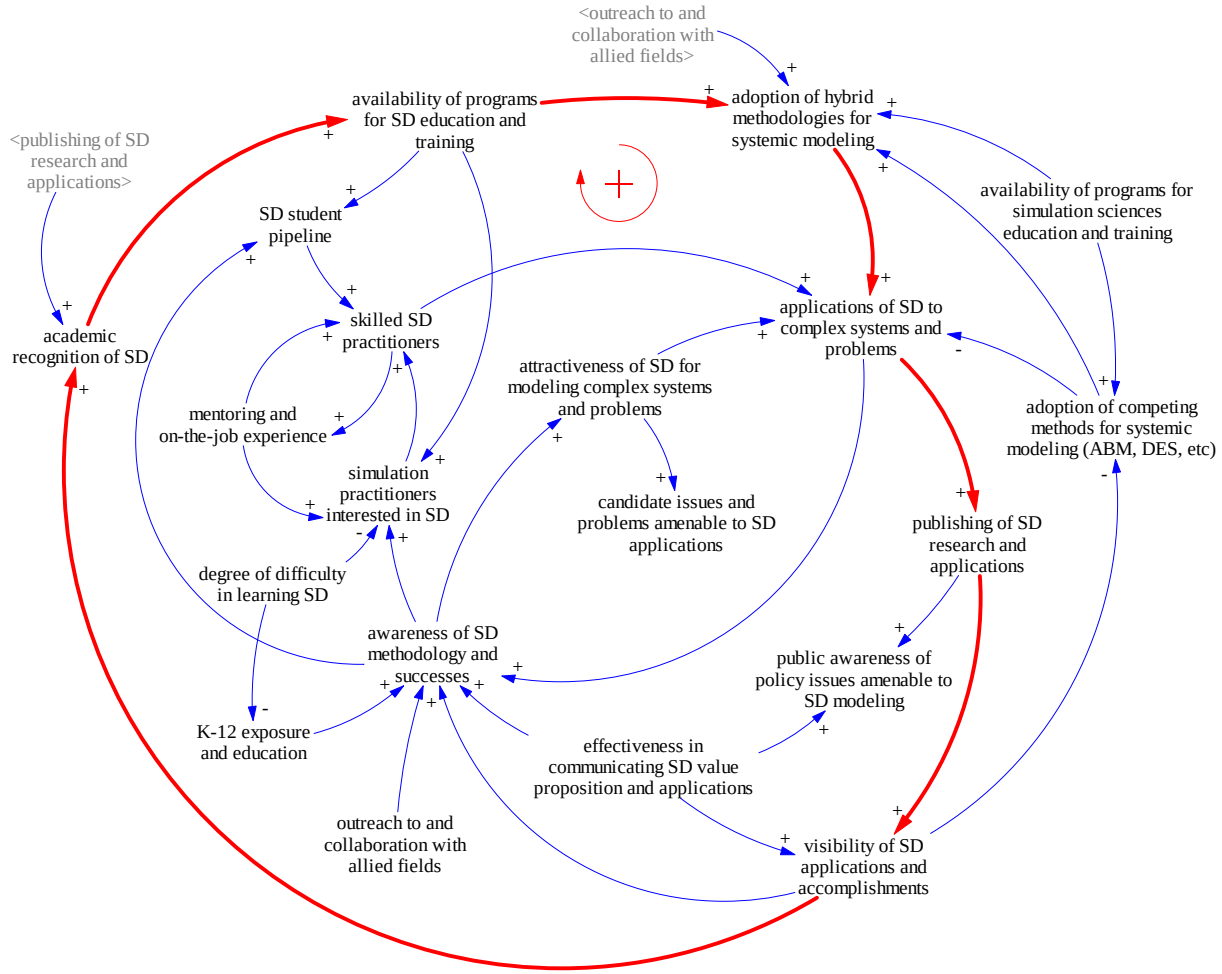
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