System Dynamics Society Strategy

Draft for discussion

Kim Warren: 22-6-12

This report summarises DRAFT strategy implications arising out of collecting opinions from people with knowledge of the System Dynamics field, concerning its state and development from 2005 to 2012 to 2020. It describes:

(a) the desired medium-term future of the field, from which can be extracted …
(b) a time-phased action-plan – essentially "*what has to happen, how much, by when*" if desired progress is to be made.

The document is organised in the following sections:

1. Description of the process
2. A draft Vision for the field
3. Scale, progress and mid-term aims for system dynamics
    - in application domains (topics to which SD is applied, such as economics, environment, health …)
    - on issues that span the whole field, such as education, consulting and the Society
    - … with implied action-plans for each

Throughout the Draft report, highlighted text indicates either

- important data missing
- possibly controversial issues with limited supporting information.

1. The Process

Developing a strategy where none previously exists requires:

- clarifying a Vision for the medium- to long-future, in terms to which people can relate
- setting out how "the system" works that should deliver those outcomes
- quantifying (approximately) the scale and rates-of-change to key parts of the system that must happen in order to achieve the desired outcomes
- extracting from these estimates the actions that need to be taken, at what rate, over what time, done by whom.

Professional Societies

A professional society is made up of three main resources – the practitioners, the knowledge or methods they deploy, and the users of the work done by those practitioners (*supply, product and demand*). The work generates new knowledge, and its impact encourages new users to ask for more work, and new practitioners to join the field to do it.

Around this core, academics and teachers train new-comers, feeding the practitioner population, and adding to the field's knowledge. An administrative system coordinates and promotes activity and may provide services, such as conferences, certification, publicity and information.

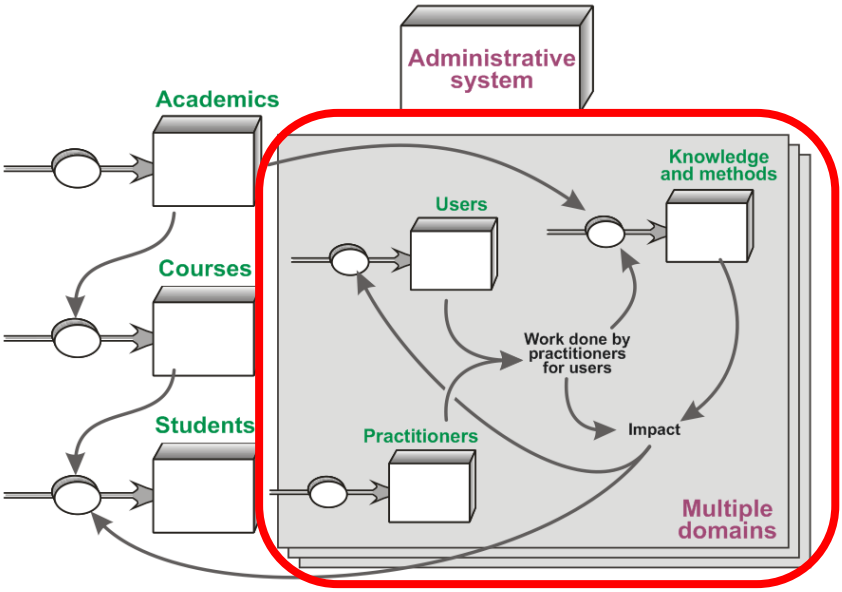
A notable addition for us is the pre-college (K-12) teaching initiative and the population of informed citizens that emerge from that process.

A notable omission for us, compared with other professional societies, is the lack of a certification system, with the body of knowledge (BoK), training and testing that would normally be part of such a system.

> **A major challenge for us – different from most other professional fields – is that our users, practitioners and knowledge/methods are fragmented amongst multiple "application domains": environment, health, economics, biology, business and so on.**

So the SD field consists of practitioners, users and knowledge "summed" across those domains, with just the education/training, some publications, and administrative system spanning all domains. (Figure 1)

Figure 1: The resource structure of a professional field



Stakeholders

The process aimed to address the interests of key stakeholder groups in the system dynamics field:

- Society Members (whether users, practitioners or academics)
- The wider community of practitioners, including consultants
- Users (corporate, governmental and other), represented indirectly through practitioners

- Academics and their institutions
- Students (adult and school/college-age)
- The providers of tools for deploying the knowledge, notably software providers
- Those involved in the administrative support system

Given the practical difficulties in communicating directly with such a diverse population, inputs were sought through a mid-scale group of about 50 people, having substantial experience across the different parts of Figure 1. This group included representatives of the following:

Society administration and critical functions.	Finance & Admin Admin and conference Society procedures and protocols Publications Electronic presence Meetings Strategy Committee	Domains (SIGs).	Conflict, Defence, Security Education Energy Environment Health Policy Information Science Psychology Bio-medical
Stakeholders.	Students - adult Students – pre-college (K-12) Members and Chapters Consulting Software and other providers Universities	Domains (other)	Project Management Economics Business Operations Management + Supply chain Public Policy

Respondents were mostly people with many years' experience in the field, or with specific knowledge. The group was asked to provide:

- their Vision for the medium-term future of the field
- their estimates of the current state of the field (2012), its recent progress (since 2005), and plausible aims (for 2020)

Each person was asked to provide estimates for key indicators across any parts of the field with which they were familiar. Between 2 to 5 respondents provided information on each of the application domains. The responses were summed or averaged, and embedded in a quantified (but not simulated) field-wide model which displays:

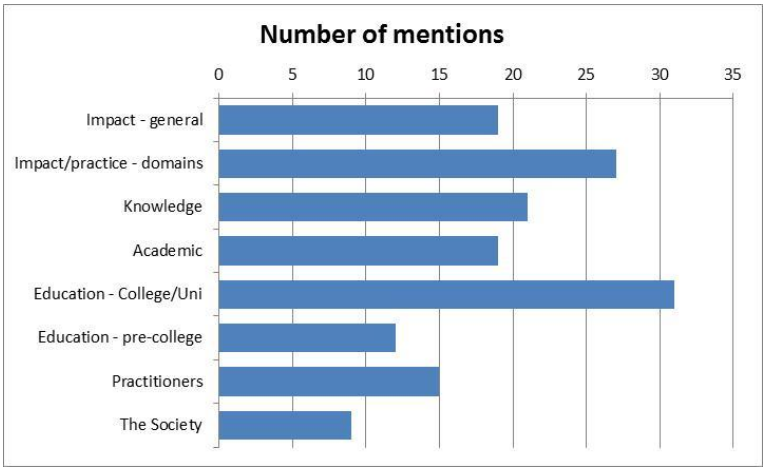
- the key resources or stocks in the field, such as practitioners, cases, teachers
- the implied flow-rates to meet the mid-term aims, such as publication rates, and training rates
- other important indicators or enablers, such as SD projects undertaken, SD-related events, and the field's reputation
- … and the interdependencies amongst these elements

From this model, it is possible to extract the implied action-plans – things that have to be done, at some rate, in order to achieve the desired outcomes.

2. A Vision for the field

The team's views on what should feature in a Vision for the future of the field is summarised in Figure 2, which results from coding their verbal statements.

Figure 2: Factors to feature in a Vision for the future of the field.



The number of mentions is not an unequivocal indication of the relative importance of each factor:

- infrequently mentioned items could nevertheless be seen by respondents as important
- items not mentioned could be 'taken as given' by some respondents
- enabling factors could have been under-stated relative to impact indicators

Nevertheless, Figure 2 gives a sense of what respondents feel is important in a Vision for the field. The main sub-topics under each broad heading, in descending order of mentions are as follows:

Impact - general	Widely known/understood Big impact examples Publicity International penetration	**Impact/practice - domains**	Senior demand SD as a preferred method Success stories Uptake by non-SD folk Articles
Knowledge	Adoption by/with others Cases Domain knowledge/ tools Conferences SIGs/ Chapters	**Academic**	Papers in other fields Journals + Ranking Quality of SD work Academic path
Education: higher	Taught in other topics Learning materials SD graduates Programs/courses	**Education: pre-college**	Taught in other topics Student numbers Learning materials Classes
Practitioners	Certification Quality of work Numbers Training	**The Society**	Member numbers Out-reach/visibility Services Finance

DRAFT Vision for the field:

Based on the submissions received, the following statement offers a draft Vision statement for the field:

> **System Dynamics will transform society by making radical improvements to decision-making in government, commerce and other organisations, globally. Powerful examples of its impact will be publicised and widely known amongst the general public, and people with authority will be fully aware of how system dynamics can radically raise the effectiveness of what their organisations seek to do. Organisations will employ or seek support from large numbers of experienced professionals with deep skills that are defined, recognised and valued. Those professionals will emerge from Universities and other training institutions who provide high-quality training, drawing on an extensive resource of accessible and rigorous teaching materials. The topic will be understood and respected throughout the academic community. System dynamics will feature in all parts of the education system, leading to widespread public understanding and demand for better policy-making throughout society.**

This is bold, and some may dispute its credibility, so to back it up, we need to look like we could deliver on this Vision, for example with a high quality public "face" for the Society and powerful presentation of high-impact SD cases.

3. The state and progress of the field

Responses are summarised in two sections:

1. Information, issues and actions relating to specific domains in which System Dynamics is applied – the section of the field's structure highlighted in Figure 1
2. Information, issues and actions relating to field-wide issues – the remainder of Figure 1

Numbers reported reflect the best judgement of the people consulted, not detailed research. Estimates varied widely, and some respondents were unable to provide all estimates. Nevertheless, the results reflect the best insights available and accessible at present.

Required actions are highlighted in purple, **who might do them is highlighted in pink**.

Application domains

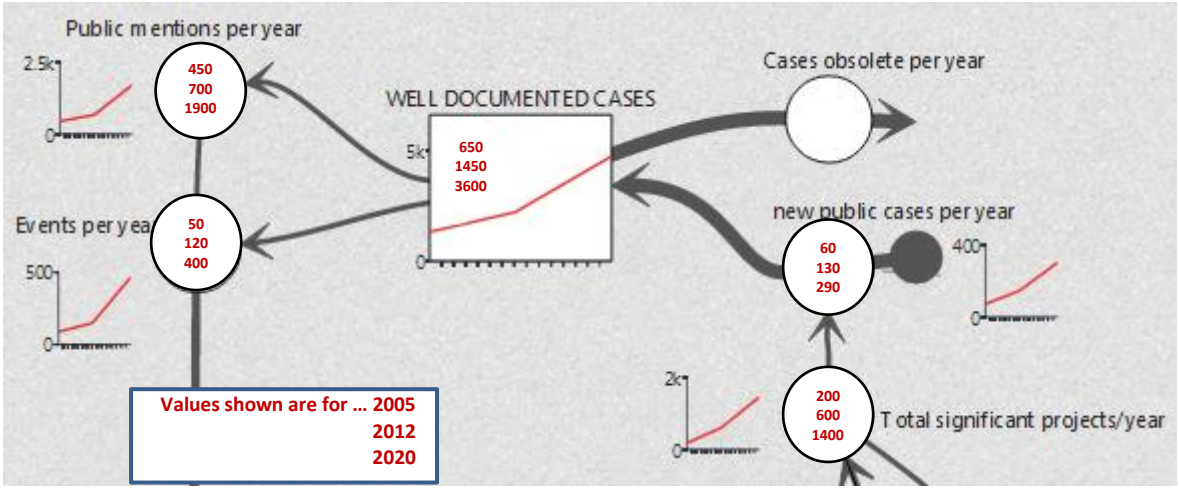
Analysis of the application domains is subdivided into three topics:

- the work done and knowledge in the domain
- users or clients for the work
- the practitioners

Work and publicity

Figure 3 summarises the rate at which projects are carried out, cases documented and publicity and events occur.

Figure 3: Work, cases and publicity in the application domains



Observations and issues:

- The number of significant projects being carried out looks plausible, and is consistent with the number of practitioners carrying out a very low average rate of SD projects – less than one per year (see below). This in turn is consistent with findings from Ken Cooper's 2011 review of the SD consulting field.
- The number of well-documented cases appears very high, reflecting large numbers estimated for several domains (not skewed by 1-2 large estimates). It is likely that respondents gave views for the number of cases documented by those who commissioned or did the work, for their own purposes, not as was intended, the number of cases publicly available. Is a reasonable estimate for this, say, 10% of the total, or about 150 total cases currently?
- The number of public mentions and SD-related events also appear high, but plausible.

Action-implications re SD work and publicity:

1. **Over 100 successful cases per year to be documented (by practitioners)**, at least to the extent of summarising:
    - the issue addressed, and its value or importance

- what was done, for whom and by whom
- the findings and resulting actions, decisions or policy-changes
- the value of the work (or other impact-indicator)

Note: refereed journal articles are a special and important sub-set of "documented cases", but much shorter, simpler documents or presentations fulfil an important purpose also.

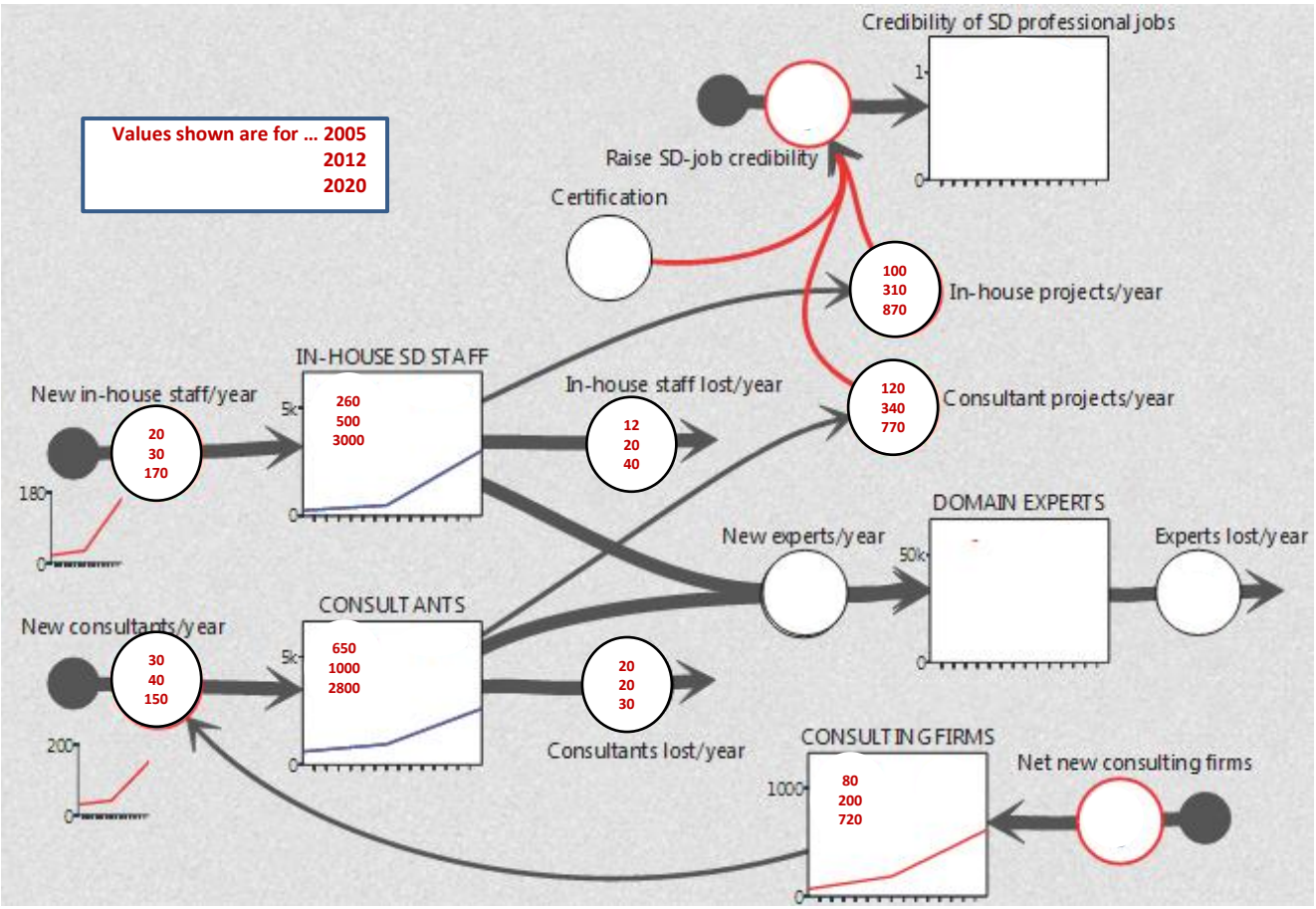
2. **Ensure ~700 mentions per year of their work in diverse media (by practitioners).**
3. **Organise and deliver ~120 SD-related events per year for users and fellow-practitioners (by practitioners).**

The SIGs play a critical role here, being the groups to which domain-practitioners relate.

The Society could assist with publicity and promoting events, if it could employ the services of communications professionals.

Practitioners

Figure 4: Estimated numbers and targets for in-house and consultant SD practitioners.



Observations and issues:

- The number of consulting firms and consultants is consistent with Ken Cooper's 2011 study, but the number of SD-skilled and active consultants is very small.
- The number of in-house SD-active staff is also very small.
- The number of new practitioners per year is consistent with the estimated stocks, and not only small, but a very small fraction of the estimated number of SD-skilled graduates (approaching 2000 per year) emerging from Universities. This is consistent with the very low rate of graduate engagement with SD-based jobs found in a 2008 Mannheim study.
- Respondents appear to have interpreted "domain experts" as meaning simply people who had worked in the field for some time, rather than – as intended – the small number of thought-leaders in each domain.

Action-implications re practitioners:

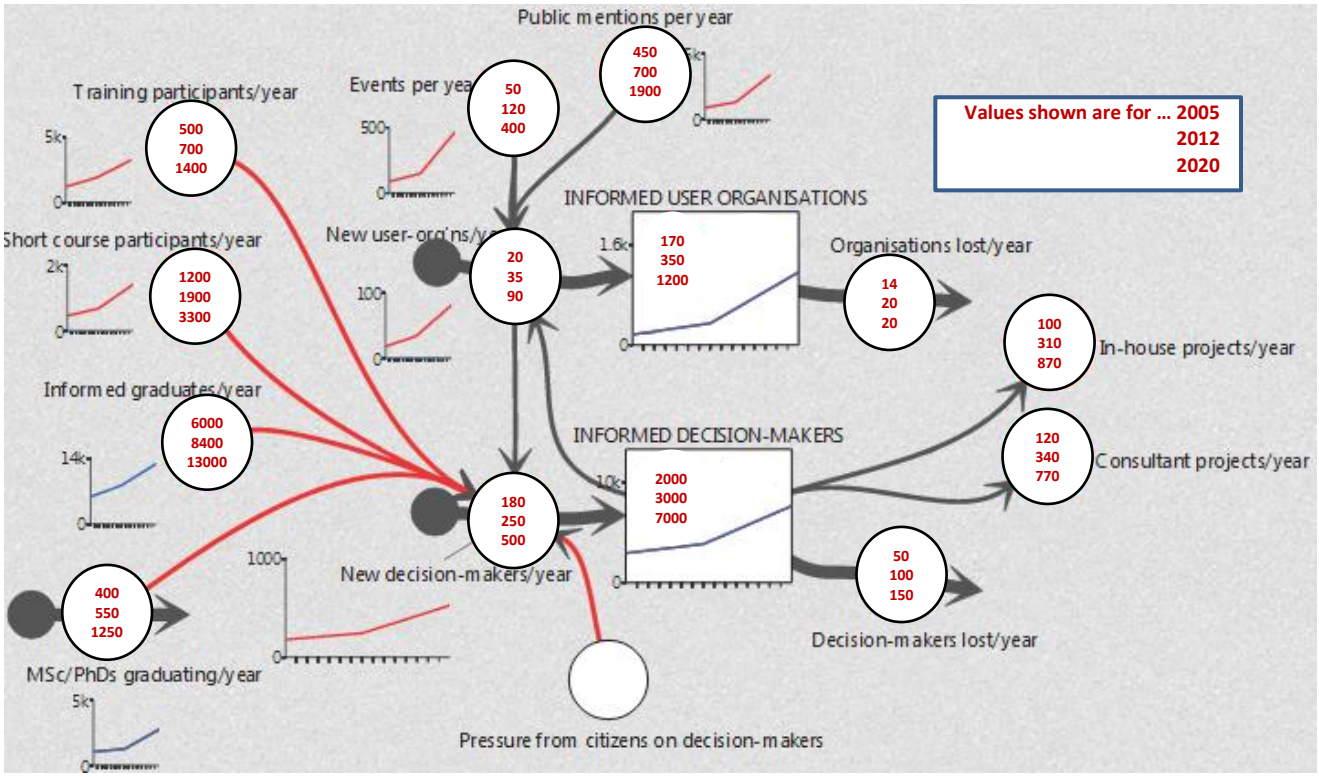
There are few direct action-levers available to any stakeholder group in the field to increase the rate at which the consultant or in-house practitioner communities grow. There appears to be very little recognition or credibility to SD-focused professional jobs.

4. **The Society should urgently establish a certification program to create this credibility (who?).**[1]

Otherwise, growth in consultant and in-house practitioner communities is dependent on building demand (see below), in which area action will have to focus.

Users and demand

Figure 5: Informed user organisations, decision-makers and demand



Observations and issues:

- The numbers of SD-informed organisations and decision-makers are both minuscule, compared with the potential universe.
- The number of SD-based events and public mentions in media have both been small, and even when ramped up for the future are not expected to have substantial impact. However, it is possible that this leverage is badly under-stated – much greater impact has been achieved in other fields.
- The rate of increase in informed decision-makers should be boosted by flows of people through SD training, short courses, degree programs that include some SD, and SD-specialist graduates, but the very slow rate of conversion (which appears realistic) reflects
  - the small fraction of people to reach decision-making levels
  - the long lead-time, even if this occurs
  - the 'forgetting' of SD during this process
- "Pressure from citizens" is a key feature of the strategic focus on K-12 education.

[1] Another small Society has identified a simple fix for certification – rather than undertake the huge task of developing a body of knowledge and setting up certification procedures, it plans to automatically certify all graduates from recognised Masters or PhD programs (perhaps setting a pass-grade). This enables all future and past graduates to gain certification, whilst ensuring adequate standards.

Action-implications re users and demand for SD:

Demand-growth is a key weakness in the field – across all application-domains, estimated numbers of informed people and organisations are insignificant, with the possible exception of healthcare and public policy in some geographies.

5. **The Society should urgently undertake documentation and publicity of successful SD interventions (SIGs/practitioners and the Society).**
6. **Substantial numbers of events are needed to inform decision-makers in all domains of SD's potential, including exploiting on-line facilities (SIGs, Chapters, the Society)**

Cross-field issues

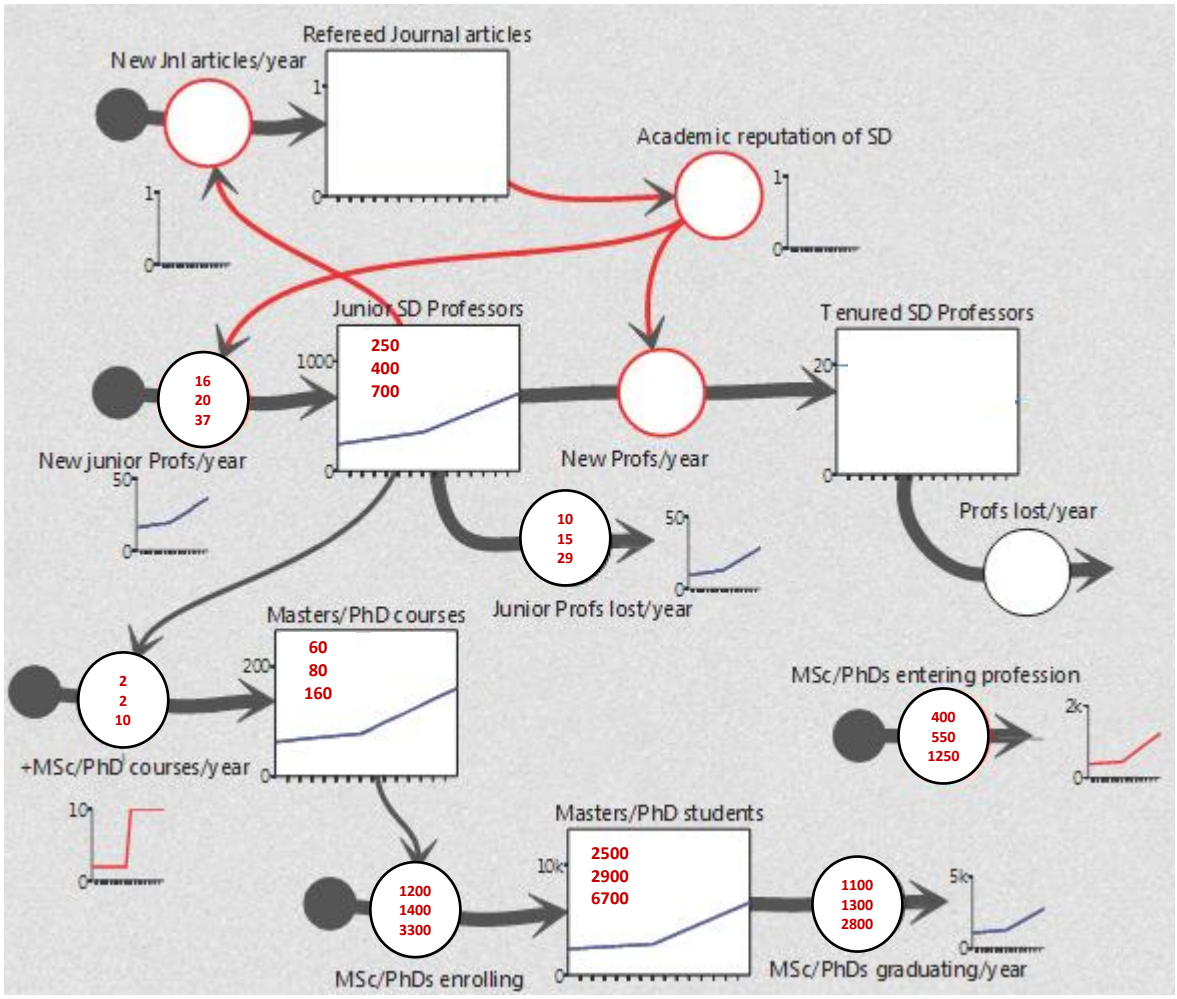
This section is organised in the following topics:

- University academic s and degrees
- University and other adult training
- K-12 teaching
- The International System Dynamics Society

Two important aspects of the field have not received sufficient attention in the study – software and other tools, and consulting firms.

University academics and degrees

Figure 6: Professors, degree programs and graduates (Data on articles to be added, including SDR/other split. Tenured professors numbers to be added)



Observations and issues re University academics and degrees:

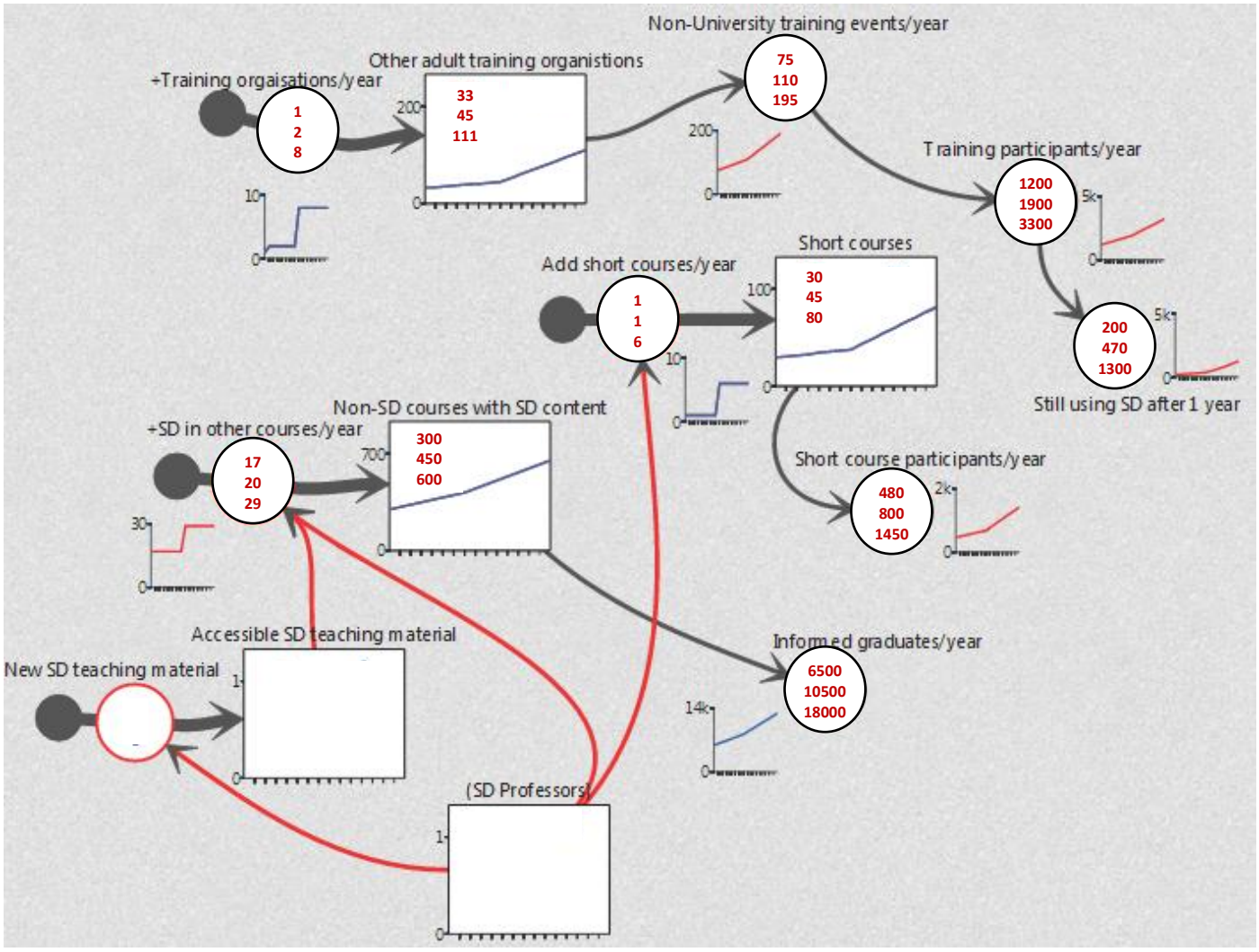
- The higher-education system is generating a strong number of top-end graduates each year, but few are believed to be entering the profession (getting jobs where they routinely use SD). Even this estimate is greater than is consistent with the estimated stock of practitioners (see earlier section).
- There may be additional numbers of 1st-degree graduates with significant SD skills missing from these data.
- The number of SD-focused professors is modest, but strong growth is desired.
- There are inexorable forces at work in academia acting against the interests of the field.
    - "Publish or perish" is forcing academics to associate strongly with recognised disciplines
    - SD is not widely accepted as a recognised discipline
    - therefore academics with SD interests are best-advised to focus on other disciplines
    - … and it is increasingly difficult for Tenured professors to be appointed on the basis of strong SD capability

Action-implications re University academics and degrees:

These forces at work in the academic field raise the risk that neither the desired growth in professors, nor in degree-courses and graduates will be achievable.

7. **The academic community urgently need a strategy that offers the possibility of growing junior and tenured professor numbers, whilst raising their recognition and status relative to established disciplines (SD-academics).**

Figure 7: Adult training – University and other



Observations and issues re University and other adult training:

- There is a significant rate of introductory adult training in SD, though insignificant in relation to the potential population.
- Given this training rate, the field appears to be converting only a very small percentage to "informed decision-makers" (estimated stock of just 3,000). *This is especially remarkable, given sales of The Fifth Discipline estimated at >1million.*
- Very few of these trainees appear to develop into serious SD practitioners.

<u>Action-implications re University and other adult training</u>:

The poor conversion of SD adult trainees into practitioners and SD-informed decision-makers suggests that action needs to be taken to consolidate their skills, and to enhance the perceived value of those skills amongst their peers.

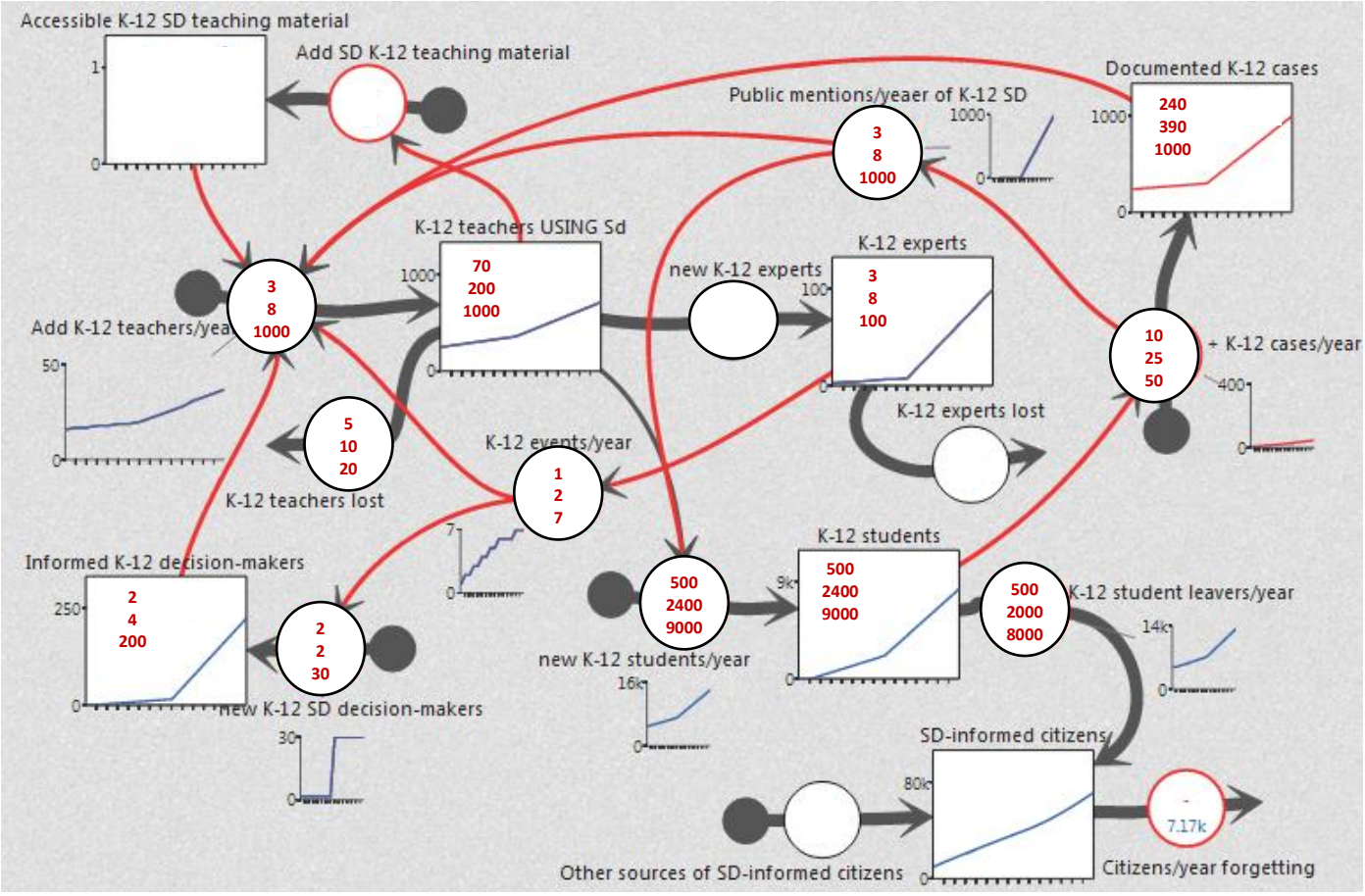
8. **Current adult training needs to be extended by supporting recent trainees in their efforts to apply SD and deploy the results of their work (SD-academics and trainers).**
9. **Considerable effort is needed to document and promote the results of good SD work (SD-academics and trainers + SIGs + conference organisers)**

The Society might assist with this effort, if it were able to resource strong marketing and promotion activity for SD work.

K-12 Teaching and students

This section is still being checked with Lees Stuntz who provided most of the information, and others with an interest in K-12.

Figure 8: Pre-college teaching and students (K-12)



The pre-college education segment causal structure is as follows:

- Teachers enrol students on classes, who then graduate and join the community of SD-informed citizens.
- Students generate case examples, that can feature in public mentions
- New K-12 SD teachers are brought in due to the support of informed decision-makers, public mentions and events, availability of good materials, and documented case examples
- Experienced K-12 teachers become experts who can promote events.

The structure and data in Figure 8 is largely consistent with estimates provided by Diane Fisher

Observations and issues re pre-college (K-12) education:

- The enthusiastic efforts to promote SD in K-12 education have made progress against dis-interest from informed decision-makers in the education establishment.
- Hoped-for progress is at a much more rapid rate than in the past.
- This progress is dependent on strong flows of new cases, public mentions, public events, and conversion of decision-makers.

Action-implications re K-12 education:

There may be little that SD aficionados in pre-college education can do alone that they are not already doing.

10. **Considerable effort is needed to document and promote the results of good SD inputs in K-12 education (SD-teachers)**
11. **This might be assisted by an equally considerable increase in the visibility of SD work done in the adult world (SIGs, Chapters)**

The Society might assist with this effort, if it were able to resource strong marketing and promotion activity for SD work.

The International System Dynamics Society

This section is not completed, since the implications for the Society itself follows on from the developments aspired to by the wider community. Nevertheless, some important issues are likely to emerge:

Cash. The Society has adequate cash reserves for its current and planned activities. Any major change to its strategy in order to pursue the ambitious objectives noted in previous sections will require a substantial up-rating of its cash-flow. Options for achieving this include:

- Significantly stronger membership numbers
- Building up a stock of products and services for sale
- Running more events, especially targeted at commercial clients

Membership. The Society's membership is extremely small, both in comparison with other professional societies and with the likely population of people with an interest in the subject. Moreover, growth has been very slow and churn very high. This implies that potential members – especially practitioners - are not valuing the benefits of membership. To make progress towards any of the aims supporting the community's Vision requires a substantial (orders-of-magnitude?) increase in membership growth, and cut in member losses.

12. **Actions for the Society - to follow**