Idea Paper: Establishing a Professional Society for Research Software

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***Abstract*—This paper provides motivation and an initial plan for creating a professional society (or extending the scope of an existing organization) in research software. The aim of this paper is to initiate a dialogue on this topic.**

I. Introduction

This paper is concerned with "research software", by which we mean the software which is needed to conduct research, whether it is simulation codes, workflow scripts, visualization and data analysis tools or low level system software for new computing environments.[1]

Research software is behind many modern advances in science and engineering, facilitates new understanding and research methods in the humanities, social sciences, education and the arts, impacts the research and development agenda of our major industries, and contributes to national security. In addition, as we investigate new mechanisms of teaching and learning in our schools and colleges we expect research software to play an increasing role across the spectrum of educational activities.

The development, use and sustaining of research software takes place around the world primarily at university campuses and national laboratories by a distributed, unconnected and often unrepresented set of students, postdoctoral researchers, programming staff and early-stage faculty. It is a matter of debate as to whether the current credit mechanism can properly assess or reward the broad workforce, and the broad activities, involved in providing and supporting research software. The current accepted mechanism is via research or experience publications such as to the SIAM Conference on Computational Science and Engineering, the IEEE Journal of Computing in Science & Engineering [1], PLOS ONE [2], and others. Other groups, such as within FORCE11 are looking into software citation mechanisms [6] which could contribute particularly to quantifying how software contributes to scientific discovery, and hence towards promotion and tenure.

Many researchers and practitioners in traditional disciplines are members of professional societies — for example the American Physical Society [3], the Association for Computing Machinery [4] or the Institute of Electrical and Electronics Engineers [5]. These societies are able to represent the feelings and wishes of their members, and thus provide the opportunity to influence change at a high and fundamental level.

This paper proposes the development of an independent entity which could act as a "professional society" for those involved in research software. The broad aim of such an entity would be to bring together those developers, educators, researchers, and professionals with an interest in research software to promote dialogue, share resources and experiences, address challenges and support professional development and furthering the profession of research software development and support. In addition, such a society would represent the public interest in promoting the role of research software.

This paper lays out initial thoughts on the role this society might play, and how it might be constructed, funded and sustained, in the hope that this could be the start of an ongoing conversation in the WSSSPE community. The end of the short paper lists potentially similar activities, and if there is interest in moving ahead with the ideas here, a first step should be to investigate if the activities would fit within an existing organization, or an existing organization might be modified to include these activities.

II. Potential Roles

This section collects together potential roles that a professional society for research software might fulfil.

1) Be the leading voice for research software and an authoritative source of information for the advancement of research software and its role in benefiting society.
2) Support professional growth of members through opportunities for life-long learning, career development, and professional networking.
3) Advocacy and lobbying for research software and research software providers to federal agencies and congress including funding and career paths.
4) Coordinating body to collect and analyze information about research software.
5) Provide effective programs in support of the research software community and the conduct of the development and sustaining of research software.
6) Collaborate with national scientific and research societies for the advancement of research software, research software education and through this the science community.

[1]The term "research software" is here specifically chosen over "scientific software" to emphasis that such software is not limited to scientific disciplines, but is essential across all academic and increasingly industrial disciplines.

7) Advertising of jobs in research software development, potentially leading to a mechanism to facilitate contracting across sites for software expertise.
8) Coordination of awards to reward aspects of software development.
9) Investigating research software alumni and contribution to society.
10) Hold and sponsor conferences and workshops in research software
11) Support journal or other communication medium.
12) Promote an active, engaged and diverse membership, and support diversity and inclusion across the research software community.
13) Provide public outreach around research software.
14) Establish and reward outstanding mentors who can help develop the community.
15) Provide material to help influence the promotion of research software developers, for example providing information useful for improving reference letters, resumes, etc.
16) Develop and monitor education programs in research software development.
17) Through membership establish professional qualifications, e.g. fellows.

III. Potential Funding Mechanisms

Funding mechanisms discussions need to include both short term plans which are focused around start up activities, and longer term plans focused on appropriate and realistic sustainable funding models. Realistic understanding particularly of longer term funding is essential.

1) Short term initial funding from foundations such Gordon and Betty Moore or Sloan to provide necessary flexible funding in preliminary stages.
2) Short term funding for people networking from NSF RCN-like solicitation.
3) Initial donations from large sites with a vested interest in promoting research software (e.g. current HPC centers)
4) Membership fees for individuals, sites, and software projects.
5) Gifts/membership fees from vendors and industry.

IV. Potential Organization

Going ahead with establishing a society would be dependent on there being individuals interested, motivated, and with the right skills to organize and lead the activity. This motivates the need to understand the essential elements needed to bring together into a comprehensive plan. Generic elements towards forming a non-profit organization in the US include

1) Find funding to start planning and some operations at a supportive host university or other organization, then establish a non-profit organization and apply for tax-exempt status.
2) Establish a group to develop and implement below plans, think about leadership, mission statement, advisory team/board.
3) Articulate well the scope of issues for the organization and the demographic and stakeholders it will serve.
4) Establish a business plan and staff plan, e.g. Executive Director, communications coordinator, administrator, come up with a budget plan.
5) Make sure there really is a need and interest in the organization, and potential funders.
6) Choose a name (with free domain name), and state in which non-profit will be registered.
7) Assemble a board of directors (3-6 people) with appropriate experience and diversity across the target demographic.
8) Follow steps to incorporate the organization, which will be state dependent. This will include finalizing the name, filing articles of incorporation and creating bylaws.
9) File for nonprofit status (involves significant fees, paperwork associated with federal and state tax exemptions).
10) Develop a sustainable fundraising plan and apply for foundation grants after being awarded 501(c)(3) status.
11) Create a marketing plan to recruit donors and volunteers.
12) Provide good communications and online presence including social media.

V. Similar Activities

As mentioned in the introduction, if the idea of a professional society for research software is of interest, then the very first task should be to consider where there is overlap with existing societies, if an additional society is needed, and whether existing societies might be extended instead of forming a new society. Also, there are mature domain-specific societies in some disciplines which should also be looked at in regard to their potential role. A close second task should be to consider whether there might be additional new communities that could be included under the same discussions — for example in reproducible science or cybersecurity, as well as thinking about how the research data community overlaps with the interests of the research software community — and whether it could make sense to pursue a society focused on both research data and software.

a) Coalition for Academic Supercomputing Centers (CASC): CASC [7] is an educational nonprofit 501(c)(3) organization representing many US universities and computing centers. CASC advocates the use of the most advanced computing technology to accelerate scientific discovery for national competitiveness, global security, and economic success, and developing a diverse and well-prepared 21st century workforce. CASC's mission is to disseminate information about the value of HPC and advanced communications technologies; provide an ?expert resource? for the Executive Office of the President, the Congress, and government agencies; and facilitate information exchange within the academic scientific computation community.

b) Association for Computing Machinery (ACM): The ACM [4] is the world's largest computing society. The ACM carries out it's mission through conferences, publications, educational programs, public awareness activities, and special

interest groups. ACM has more than 100,000 members from industry, academia and government institutions around the world. ACM publishes, distributes and archives a large number of research and experience publications in computing and information technologies. ACM includes a large number of Special Interest Groups (SIGs) to represent major areas of computing including Software Engineering and Simulation.

c) Research Software Engineers in the UK: In the United Kingdom, the Research Software Engineers (RSEs) in the UK group citerse is based around staff engineers rather than the field of research software as a whole. It's objectives are to create a community to represent UK RSEs, raise awareness of RSEs; campaign for the recognition and reward of RSEs; campaign for RSE to be a formal role in academic; organize networking events for RSEs.

d) Software Sustainability Institute (SSI): Based at the Universities of Edinburgh, Manchester, Oxford and Southampton, the mission of the Software Sustainability Institute [9] is to cultivate better, more sustainable, research software to enable world class research. SSI has built a network of Fellows across research disciplines, championed research software and software career paths to stakeholders, worked with projects to improve codes, written guides on software sustainability, and organized training events.

e) NumFOCUS: NumFOCUS [10] is a non-profit 501(c)(3) organization with a mission to promote sustainable high-level programming languages, open code development, and reproducible scientific research through educational programs and events as well as through fiscal sponsorship of open source data science projects. NumFOCUS aims to increase collaboration and communication within the scientific computing community. Software Carpentry, IPython, Jupyter are all sponsored NumFOCUS projects.

f) Association for Learning Technology (ALT): In the United Kingdom, the registered charity ALT [11] is a professional body and learned society which includes as institutional members many of the UK's universities along with public sector agencies and companies in the IT sector. Activities of the ALT include a major conference, workshops, certification of members, consultations around learning technology and e-learning, and producing an open access journal. Core goals of ALT include promoting the intelligent use of learning technology, strengthening research and practice in the area, providing input to educational leaders and influencing policy, representing members, creating and supporting professional development, and providing communication.

g) Advanced Computing Systems Association (USENIX): The USENIX association [12] is a non-profit 501(c)(3) organization with represents a community of engineers, system administrators, scientists and technicians working in the cutting edge of the computing world. USENIX goals are to foster technical excellence and innovation, supports and disseminate research with a practical bias, provide a neutral forum for discussion of technical issues, and encourage computing outreach into the community. USENIX mechanisms include annual technical and system administration conferences, informal specific-topic conferences, a tutorial program, a special interest group for system administrators, student programs, an online library, involvement in standards efforts, international programs, and annual awards.

VI. Conclusions

This short paper gathers very preliminary ideas around the need for a professional society of research software, or for incorporating research software more fundamentally under the wings of an existing professional society. The aim of this paper is to stimulate discussion among potential members and stakeholders of such a society.

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References

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[3] American Physical Society (APS). https://www.aps.org
[4] Association for Computing Machinery (ACM). http://www.acm.org
[5] Institute of Electrical and Electronics Engineers (IEEE). https://www.ieee.org/index.html
[6] Force 11 Software Citation Working Group. https://www.force11.org/group/software-citation-working-group
[7] Coalition for Academic Supercomputing Centers (CASC). http://casc.org
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