

Open Source Science Applied to CMNS Research: A Paradigm for Enhancing Cold Fusion Prospects and the Public Interest

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Abstract

Open Source Science (OSSc) is a collaborative, voluntary (uncompensated) and highly distributed method of research that emphasizes the use of new digital technologies, particularly the Internet. The OSSc paradigm grew out of the open source software movement, which has resulted in wide availability of free software (such as the Linux operating system) as an alternative to proprietary software products.

The public interest in the success of cold fusion has long been recognized because of the potential social welfare benefits related to its possibilities for very low cost energy. Cold fusion researchers, because of rejection of their field by mainstream science and continued highly marginalized research conditions, employ many of the methods and tools of OSSc. For example, they use websites for posting research papers and Internet discussion groups for introducing ideas and dialoguing online about the relative merits of those ideas.

The prospects of cold fusion success may be significantly enhanced by extending the current informal and implicit use of OSSc-type methods to more organized and explicit deployment under the sponsorship of a recognized professional organization such as ISCMNS. A formal, sponsored use of OSSc for support of cold fusion could bring powerful OSSc methods into play that are not currently used. The prospects for cold fusion success, and the associated public interest in that success, may be significantly enhanced by expanded and more disciplined application of OSSc methods by the research community.

1. Introduction

Open Source Science (OSSc) is a recent development in the methodologies of scientific investigation that departs significantly from scientific practice as it has evolved in recent decades. OSSc is enabled by technologies of the digital revolution, particularly the Internet, and embraces a collaborative investigative approach. OSSc grew out of Internet-supported collaborative development of software under a paradigm known as Open Source Software (OSS). One particularly successful example of the OSS paradigm is the Linux operating system software.

Cold fusion (CF) is a potentially revolutionary scientific discovery in which nuclear fusion is achieved at non-explosive rates and at ambient (near-earth-surface) temperatures. CF¹ was announced by two research chemists² in 1989 as a scientific breakthrough with promise of meeting most of the energy needs of society. However, for a variety of reasons (both technical and sociological), CF was rejected by the mainstream scientific community within a year of its announcement.

Despite this rejection, research into CF has continued under highly marginalized conditions by a relatively small group of capable and reputable scientists. This research appears to show evidence of the validity of CF phenomena. With its current state of rejection and marginalization, CF appears to be an ideal candidate for research under the OSSc paradigm, not only because of the appeal of voluntary research contributions in the absence of funding from conventional resources, but also because of theoretical challenges whose resolution may benefit from the insights and perspectives of other fields besides nuclear physics.

2. The Open Source Science Paradigm

Open Source Science is a paradigm for conducting research that differs substantially from conventional science as it has evolved in the last few decades. In the OSSc perspective, research (and the resulting knowledge) is viewed as a public good – as belonging to the commons – and as freely accessible rather than protected by property rights. This perspective was initially brought forth in the context of collaborative development of computer software (OSS) and has extended into other areas, including publication of technical literature (Open Access, OA) and scientific investigation (OSSc).

OSSc not only reemphasizes a traditional viewpoint toward science and knowledge as part of the commons, but it also makes use of powerful tools, such as communication and electronic file management functions of the Internet, to further or enhance collaboration in scientific investigation. It also encourages, and provides the means for, the synergy of many people with different backgrounds and perspectives to attack a problem. Such collaborative effects provide the basis for cross-fertilization among different fields and disciplines, one of the most powerful methods of achieving new insights into a problem area³.

Although OSSc represents a constructive return to the traditional values and practices of science, and adds significantly to scientific practice through the power of the Internet, it is not without issues. For OSSc specifically, Schweik (2007) identifies four areas needing urgent

¹ Some CF researchers have sought to replace “cold fusion” with other more accurate terms, including “low energy nuclear reactions” (LENR), “chemically assisted nuclear reactions” (CANR), and “condensed matter nuclear science” (CMNS). Although the new terms are legitimate and helpful, “cold fusion” continues to be readily recognized and widely used.

² Martin Fleischmann and Stanley Pons

³ Several websites have been set up specifically to offer rewards and provide a venue for creative people of different disciplines to seek solutions to problems that have proven to be intractable within the field in which they originated. See, for example, the *Innocentive* website at <http://www.innocentive.com>.

attention: 1) how to license digital material besides software; 2) how to achieve success in the context of current incentive structures for researchers; modify incentives and develop a “next-generation” e-journal; 3) how to govern collaboration under the OSSc paradigm; and 4) how to finance projects under the OSSc paradigm.

The central question for successful application of the OSS paradigm to science (OSSc) is the provision of adequate incentives for the broad spectrum of potential participants.

3. Cold Fusion Research and Reporting Today

If it proves to be real, CF will be good news for the welfare of humanity because it holds the promise of providing abundant supplies of energy from nuclear sources at temperatures close to the surface of the earth and with little or no associated harmful radiation. Despite the initial rejection of CF, a number of capable and reputable researchers continued their investigations – and continued to achieve positive results. For example, a recent CF publication (Storms 7007) tabulated some 184 confirmations of excess heat (indicating cold fusion reactions) from 1989 to 2004. The situation with CF – continued affirmative results without general acceptance initially by the scientific community – is typical for radical new discoveries and has been well characterized by Kuhn (1986).

Cold fusion researchers, in spite of (or perhaps because of) the rejection and marginalization of the field, have formed a relatively close-knit (although often fractious) community that has its own methods of conduct, communication, critique and reporting of research results. The Internet has played a key role in the success achieved in that research. Continued and expanded use of the Internet will be a major ingredient of support of CF research in the future. The salient communication and reporting methods currently used are described below.

Professional Organization. The International Society for Condensed Matter Nuclear Science (ISCMNS) is the accepted CF-dedicated professional organization. According to its website¹, the ISCMNS mission is “to promote the understanding, development and application of Condensed Matter Nuclear Science for the benefit of the public”. The organization is governed by a constitution and executive committee, and it maintains a code of conduct for its members.

Conferences. The CF research community presents papers on theory and experimental results in mainstream science conferences where such opportunities can be found. Because of its marginalization, CF has also been the topic of dedicated conferences (International Conferences on Cold Fusion, ICCF) since 1991, with meetings held in various countries about every 18 months. The ICCF conferences are held under the auspices of the ISCMNS. ICCF-14 took place in August 2008 in Washington, D.C.² with over 180 attendees.

Peer-Reviewed Journal. As in the case of conferences, CF researchers publish peer-reviewed papers in mainstream scientific journals – where their papers are not rejected outright because of the topic. In response to a strong need for additional publication outlet,

¹ <http://www.iscmns.org/>

² <http://www.iscmns.org/iccf14/index.htm>

ISCMNS has initiated a CF-dedicated open-access and peer-reviewed journal, the Journal of Condensed Matter Nuclear Science¹ (JCMNS).

Publications Repository. A website entitled LENR-CANR² provides an online library with a bibliography of more than 3500 journal papers, books and news articles related to CF. Included in the library are more than 500 scientific papers in PDF (Acrobat) format. Three e-books are also available on LENR-CANR for free downloading. Jed Rothwell's "Cold Fusion and the Future" (2007) is intended to "show that with cold fusion we can accomplish marvelous things" (p. 1). Edmund Storms' "A Student's Guide to Cold Fusion" (2003) is somewhat more technically oriented. Beaudette's "Excess Heat – Why Cold Fusion Prevailed (2002)" is one of the most important CF reference works published to date.

Newsletters. The best-known and most complete CF newsletter is "New Energy Times" (Krivit 2007), which is produced bimonthly by the New Energy Institute, with Steven Krivit as editor and publisher. It is available online for downloading³.

E-mail Thread in CMNS Google Group. An e-mail thread for about 100 CF researchers is maintained in Google Groups by Haiko Leitz⁴. Participation is by invitation – new members must be recommended by a current member before being added to the list by Leitz. The CMNS list is quite active, typically with 12 to 20 postings daily.

Thus, cold fusion research as it is conducted today already has many of the characteristics of research under the OSS paradigm, such as performance of low-budget research by many investigators and at many locations.

4. Enhanced Application of Open Source Science to Cold Fusion Research

Although the methods currently used by the CF research community have many open access features, additional measures are available under the OSSc paradigm to enhance development, communication and reporting of research results. One of the primary contributions that OSSc can make to the CF research effort is to provide the means for increased collaboration, particularly by those having expertise in other fields. Examples of Internet tools that are available to enhance communication and reporting are shown in Table 1.

¹ <http://www.iscmns.org/CMNS/publications.htm>

² <http://www.lenr-canr.org/>

³ <http://www.newenergytimes.com>

⁴ cmns@googlegroups.com

Table 1. Internet Tools for Communication and Reporting¹

Information Type	Online Tools	Method of Distribution
News	Blogs Podcasts Moblogging	RSS Automated e-mail newsletter User checking Web site
Events	Calendars	Open standard event formats (.ics, iCal, vCal, etc.) RSS E-mail alerts User checking Web site
Participatory Dialog/Interactivity	Forums Blog entry comments Polls Real-time text chat Video chat Webinars	RSS E-mail subscriptions to comments or forums Online polls/surveys User interacting with Web site Chat programs Webinar services
Documents/Images	File manager Searchable image gallery	FTP, RSS E-mail notification Dashboard
Contacts/Members/Groups	Membership database	Searchable database, links in forums/blogs
Shared applications/documents	Google Docs Zimbra.com Basecamp.com	Online access to shared application
Summary, quick glance, monitoring change	Digital dashboard	Web page Desktop application (<i>e.g.</i> , Visio) Mobile phone application

Under an upgraded scenario (referred to as the CF/OSSc paradigm), emphasis would be placed on developing a clear statement of the “CF case” in a mildly promotional tone and making it easily accessible. The various sources of CF information – books, websites, papers, repositories, etc. – would be identified and categorized to facilitate the task of newcomers to the field in “coming up the learning curve.” The needs of both the general public – for general information for making an informed decision about CF – and potentially interested sophisticated researchers, who need a more in-depth introduction to the field, will be addressed. Table 2 provides a summary of the inferred CF research and communication requirements along with a listing of current and proposed CF/OSSc methods of meeting the requirements.

¹ Adapted from “Models of Collaboration Tools,” Prof. Gary Chapman, LBJ School of Public Affairs, The University of Texas at Austin. Online.
http://www.21stcenturyproject.org/collaboration_tools.htm.

Table 2. Current Methods and Proposed OSSc Approaches for CF Research and Communication

Function/Requirement	Current Method or Tool	OSSc Approach¹
Real-Time Professional Exchanges	-E-mail list on GoogleGroups, managed by Heiko Leitz	-As currently; periodically post e-mail threads on ISCMNS website -ISCMNS assume responsibility for GoogleGroups if/when necessary -RSS feed feature on ISCMNS website; webinar services; blogs & podcasts
Collaborative Publication	-E-mail list on GoogleGroups, managed by Heiko Leitz	-Post draft papers for download and addition through collaborative research
Cross-Fertilization Promotion	-None?	-Formulate unresolved theoretical and experimental problems and post on ISCMNS website -Provide management for responses from researchers from other fields
Shared Software & Other Tools (e.g., Experimental Design)	-Informal exchanges among individual researchers	-OSSc enhancement: Identify and post most important software and tools (e.g., experimental software) on ISCMNS website for online access
News	-“New Energy Times” newsletter (primarily) by Steven Krivit	-Mirror “New Energy Times” newsletter on ISCMNS website (or at least provide hyperlink) -Provide Internet functions , such as blogs, podcasts, RSS feeds
Scheduled Events	-“Events” on ISCMNS and New Energy Times websites	-As currently. Implement online calendar on ISCMNS website to supplement Events on existing sites
Professional Meetings & Proceedings	-ICCF Conferences sponsored by ISCMNS -Mainstream science conferences (e.g., APS March meeting) -Conference proceedings posted on LENR-CANR	-As currently. Post proceedings on ISCMNS website as mirror to LENR-CANR - OSSc enhancement: Provide webinar services?
Publication of Peer-Reviewed Papers	-Submit and publish papers in mainstream scientific journals (where available) -Publish in newly-established CMNS Journal	-As currently. Maintain posting of CMNS Journal on ISCMNS
Publications Repository	- LENR-CANR, operated by Jed Rothwell	-Mirror LENR-CANR repository on ISCMNS website -ISCMNS assume responsibility for repository if or when necessary
Public Awareness & Cold Fusion Promotion	-“New Energy Times” website (primarily), with newsletter - LENR-CANR website, with three downloadable books by Beaudette, Rothwell and Storms	-As currently. Add links from ISCMNS website -Webinar services, FAQs, wiki, RSS feed service for ISCMNS website

¹ Most OSSc enhancements are taken from “Models of Online Collaboration” by Professor Gary Chapman, LBJ School of Public Affairs, The University of Texas at Austin. See: http://www.21stcenturyproject.org/collaboration_tools.htm

5. Website Support of Enhanced Open Source Science

Implementation of CF/OSSc will make full use of the functions of the Internet. The website of ISCMNS, the accepted CF professional organization, may serve as a suitable platform for supporting the CF/OSSc implementation.

The ISCMNS website, as modified to support CF/OSSc research, would be set up to meet the requirements as set forth in Table 2. The homepage would be designed for the general public but would also fully support the sophisticated needs of the CF research community. Hyperlinks to the topical webpages and other CF websites will be used extensively to avoid “information overload” on the homepage.

Individual webpages on the revised ISCMNS website would be developed by CF topical area as described in Table 2. They would range from descriptive and promotional pages for the general public and researchers new to the field to highly technical forums and download facilities to help researchers to collaborate on such topics as theoretical underpinnings of CF and experimental designs and results. The following webpages are expected to be needed for the revised website:

Basic Non-Technical CF Descriptions	Shared Software and Other Tools
News and Scheduled Events	Publication of Peer-Reviewed Papers
Professional Contacts and Group Members	Publications Repository
Professional Real-Time Exchanges	Monitoring Changes and Quick Glance
Collaborative Publication	Financial Contributions
Intellectual Property Information	

6. Financial Support

The issues around financial support of OSSc initiatives were well articulated by Schweik (2007), apparently based in part on experience with the ORS project described above. The main points of this review are summarized as follows:

Financial support must be carefully addressed for OSSc projects to be successful.

Support must be considered in two areas – the time and effort involved in contributing to the OSSc project, and the required administrative and collaborative infrastructure.

Project financing in the past has come from seven types of revenue – government subsidies, philanthropy, corporate consortia, corporate investment, venture capital and investment banking, user or participant donations, and a hybrid or mix of the first six sources.

The costs for the time and effort for contributions may be covered by sources that are implicit in the OSSc paradigm and Mertonian science in general – donations from contributors who gain their livelihood by other means.

Administrative and infrastructure costs may be recovered in a similar manner to that used for OA publication costs, including compensation for ancillary support services, subscription models, and author-pays-to-publish models.

For the CF/OSSc project, the ISCMNS organization could establish a subsidiary foundation to control risk to the organization and to receive and manage funds. Decisions on the overall content and structure of the website will be subject to the approval of the ISCMNS Executive Committee.

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