Con:

Criticism of the Proposed Physics Information Exchange

by Simon Pasternack

I AM CONVINCED that the Physics Information Exchange (PIE) proposed by Moravcsik constitutes a serious threat to physics communication and to the physics research community. In the name of improved physics communication it would undertake to distribute an unedited, unrefereed, uncontrolled collection of documents many times larger than any physics journal. It would have a blanket exemption from the regulations of the physics journals, from the real needs of research physicists, from economic reality and from the integrity of the English language.

To avoid ambiguity I will not accept Moravcsik's definition of "preprint," but will use the term "document" to denote a duplicated scientific communication whether intended for publication in that form or not. I will reserve "preprint" to denote a duplicated manuscript that has been or is about to be submitted for publication in a regular physics journal.

PIE equivalent to publication

PIE proposes *formal*, impersonal distribution of documents to a world-wide audience virtually equal to that reached by *The Physical Review*, *Physical Review Letters* and other comparable journals, and larger than that reached by many of the smaller journals. To say that such a distribution would be more selective than journal publication is misleading. The documents would be publicly available to every interested physicist, whether at a large research center, at a small institution or in a less developed country. PIE would therefore constitute "publication" in any reasonable interpretation of the word. To call such completely circulated documents "personal communication," "private communication" or "unpublished" is a gross distortion of the meaning of words. The fact that PIE would be unbound, unpaged, unedited, unrefereed, unindexed and in many cases not even proofread by the authors, would merely make it a horrendously sloppy publication, but nonetheless it would be a publication.

From a study of the COSATI report,[1] from *Physics Abstracts* and from an AIP study of the journal literature of physics,[2] I estimate that PIE would be undertaking to reproduce and distribute per month about 100 preprints (of papers on high-energy theoretical physics actually published later in the regular literature). This number must be multiplied by a factor ranging from 2 to 10 to allow for reports not intended for publication, for rejected articles and for comments of the kind Moravcsik envisages, and by still another factor to allow for the proliferation of documents that I would expect to result from the total absence of controls. To expect high-energy theoretical physicists to go to their library to scan this flood regularly and systematically, even for "current awareness," seems to me highly unrealistic.

It is proposed that PIE documents be distributed not only to large research centers but to small institutions and less developed countries as well. Under the circumstances the estimate of 300 "preprint libraries" is a gross underestimate, by a factor of 5 to 10. Also, many of the larger institutions would want several copies of each document.

The remarks about basing PIE on an allegedly similar distribution program among biologists are highly misleading. The biology program[3] (called

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research center (and in some cases by each author). These lists are usually not kept current. Names are added from time to time, but they are seldom deleted. Little effort is made to check whether duplications occur on the list, or whether several persons at one institution might be able to share copies of preprints. There is a tendency by some persons to include on their mailing lists all the great names in physics, whether or not the physicists concerned are actually interested in the particular research. On the other hand young scientists, workers at small institutions and researchers in less developed countries, who may need preprints most, are often omitted from the lists.

In summary, the present system of administering preprints is costly, time-consuming and haphazard, and its cumbersomeness increases by the day.

The aim of the PIE proposal has been to remedy these practical defects of the preprint system. The proposal is based in part on a similar program in use among biologists, which has been operating successfully for the past four years. For the time being the PIE program would apply only to theoretical high-energy physics. It could later be extended to other fields in which rapid growth and large numbers of researchers stimulate the use of preprints.

How PIE would operate

Operation of PIE would be as follows:

Researchers in theoretical high-energy physics throughout the world could qualify for membership.

Members would be asked to form local preprint libraries in which a small number of researchers with common interests could share single copies. (The number of such preprint libraries that would be established all over the world is estimated to be about 300.)

As a member researcher completed a new paper

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the Information Exchange Groups—IEG) differs radically in scope and quality from PIE: (a) There are several IEG groups, each dealing with a very narrow specialty—not one huge group covering a broad area of biology. (b) Each IEG group consists of individual biologists, not of groups operating through a library. (c) The oldest IEG group (Oxidative Phosphorylation and Terminal Electron Transport) started with 32 individuals five years ago and grew to 600 in five years. The total number of documents sent through this group was 14 the first year and 500 all together in five years, not one or two hundred a month.

The claim that PIE would cut costs of preprint production and distribution seems specious. The general experience with currently existing "preprint libraries" has been that authors do not use them to replace their individual distribution lists, even for physicists at the same institutions as the libraries. The authors merely add the libraries to their personal distribution lists. With the flood of documents involved in PIE, the desirability of maintaining individual distribution lists, would, if anything, be enhanced.

I cannot believe that present preprint distribution patterns involve greater cost to the US government than the cost of distributing to the entire world physics community the entire world output of high-energy theoretical preprints (plus rejects, comments, reports, etc.). If that were the case, the situation would be scandalous.

Actually, to argue about relative costs serves no useful purpose because if PIE were deemed a valuable service to the physics-research community, the money to finance it would be found. However, I believe that PIE would be a great disservice.

Orderly communication essential

In a recent article in PHYSICS TODAY[4] I discussed the difference between document collections and scientific journals and stated what I believe to be the essence of scientific journal publication: the orderly communication of scientific information. I discussed the role of the refereeing system in this orderly communication and stressed the fact that the refereeing contribution lies far less in the yes-or-no decision on publishability than in the service rendered by improving the papers ultimately published—through the elimination of flaws that would bother readers other than the referee (for example misleading claims, omitted details, ambiguous statements, minor errors in argument, overlooked pertinent references, unrealized implicit assump-

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(or informal communication containing a reaction, criticism, review or rebuttal to another member's communication) he would send one good copy to the central PIE office.

PIE would reproduce the communication and mail one copy to each of the "preprint libraries." Copies presumably would be mailed to members within a week of the date the paper was received by PIE.

There would be no charge to members for material distributed by PIE.

PIE, of course, would assume no responsibility for the papers it distributed. The authors themselves would continue to be responsible for satisfying any requirements their local institutions might have in connection with the release of preprints.

There is no reason to believe that the status of papers distributed through PIE would not be the same as the status of preprints presently distributed. For example, PIE would insist that references to such papers in bibliographic citations continue to describe them as "personal communication," "private communication," "unpublished" or "to be published" as the case may be. As a result, whenever a question of priority arose, any research findings communicated through PIE would have the same credit as preprints today.

To facilitate this equal status it has been suggested that the outside appearance of preprints processed through PIE be indistinguishable from present-day preprints (except for the use of uniform paper). No number, date, cover or other means of identification would appear on the preprints except what the author or his institution had chosen to put on the original copy. It has not been decided definitely whether preprints should be handled this way, or whether a simple serial number on PIE documents might aid in referring to them without altering their status.

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tions, obscurity and discursiveness). The result is an article that is easier and quicker to read in detail and to understand and use (or even to decide not to use) and one that is more reliable than the original preprint. It is this filtering procedure that makes for the orderliness of communication through scientific journal publication.

Orderliness of *communication*—not orderliness of archival burial—is what we should be seeking. Impersonal preprint and document distribution (whether through PIE or some of the present abuses of the preprint system) amounts to sending "do-it-yourself kits"—asking every recipient to waste his time fretting over details that refereeing and editing would have cleared up, reading discursive and nonoriginal material only to decide it was not worth reading, swallowing and propagating misleading claims, and so forth. To the extent that PIE would be "successful" (that is, would preëmpt the role of communication and relegate the journals to being archival depositories) the value of the referee's careful evaluation in improving a paper would be reduced because the final product would not be extensively read. Under such circumstances most of the referees, who are themselves busy research scientists, would content themselves with yes-or-no judgments and far less detailed criticisms. And they would be far more cavalier about acceptance, especially with obstinate authors, because it really would not be worth the fuss. The journals would have only a secondary role in the scheme of physics communication.

To argue that one can remove controls on physics-research communication and rely on the researcher's self-interest is like arguing that one can replace government with anarchy because it is to the people's self-interest to behave properly. As I indicated in my earlier article,[4] we are dealing with a large group of physicists, and all the pressures of the day (competition, impatience to get on to new activities, other demands on the physicist's time and the publish-or-perish syndrome) act toward proliferation in document production.

Confusing references

One of the great annoyances to the referees, editors and readers of physics journals today is the substantial number of references to "preprints" or other unpublished reports. Such references are often difficult to track down and retrieve. The confusion and irritation is increased when (as is often the case) the offending references are found to have been published in the regular physics literature before the author corrected the galleys or, in-

Improvements offered by PIE

PIE would have many advantages over the present system of preprint distribution:

- It would guarantee a uniform and rapid distribution of preprints.
- It would cut the overall cost of preprint production and distribution considerably because (a) the mailing list would consist only of preprint libraries whose number would be less than the number of names on many present mailing lists; (b) it would be more economical to maintain only one list of permanent preprint libraries than hundreds of lists containing names of individuals constantly on the move; (c) a large centralized duplicating facility could operate more efficiently than many small facilities; (d) since PIE would receive several papers a day, it could mail papers in batches and save on postage.
- PIE would relieve scientists as well as departmental clerical help of burdensome chores.
- It would constitute a significant step in closing the present gap between physicists who have the good fortune to work in large research centers in scientifically advanced countries and physicists in small institutions or in less developed countries. Thus PIE would help to relieve the de facto and psychological handicap that burdens a researcher away from the main centers of physics.
- It would *enhance* discussion of methods, techniques and results prior to publication, thereby helping journal editors to maintain a standard of excellence in formal publications.

Because the circulation of preprints would not be a substitute for journal publication, members of PIE would be encouraged to submit for formal publication any communications they judged to be appropriate and well enough crystallized.

The operation of the PIE central office would at first involve a very modest clerical effort. It has

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deed, long before the author submitted the paper. This fact forces libraries to keep preprints and reports indefinitely or to scrounge copies of reports that are no longer readily available.

The problem would be greatly exacerbated by the proposed PIE system. Since PIE distribution would be so wide as to constitute effective publication, the number of such references would increase. The confusion, even in the regular physics literature, would be reduced by giving each PIE document an accession number and allowing reference to it by that number instead of tantalizing the reader by the untraceable euphemism "private communication." But then, of course, the need for libraries to keep PIE documents on file would become even greater, and PIE would constitute publication even by its proponents' definition.

Given the proposed wide, formal PIE distribution, what would happen if a physicist chose to ignore (or pretended to ignore) the "unpublished" PIE documents and submitted for publication a manuscript that duplicated in whole or in part material distributed under PIE? Would the journal editors and their referees object, or would they maintain the current journal policy that "we do not hold authors responsible for knowing about as-yet-unpublished work"? Who would have priority? To be sure, such problems arise now under some of the current abuses of the preprint system, but they would be multiplied many times by PIE. I do not believe that physics journals could maintain the fiction of an unpublished (and unreferrable) PIE. Nor can I see how they could justify exempting PIE from their general policy of not publishing papers that have been published elsewhere.

To claim, as Moravcsik does, that the four, six or even twelve months that elapse before a finished piece of research appears in a journal is in some fields an intolerably long delay, which can be overcome by PIE, ignores the existence of the letters journals intended to provide fast distribution of worthwhile and urgent material. It is unrealistic to expect that PIE would not adversely affect the communication value of the letters journals.

Suggestions for improvement

In my earlier PHYSICS TODAY article I discussed the problems presented by the rapid growth of the regular journals, even with the controls imposed in the interest of orderly publication. I indicated some of the things the American Physical Society and the American Institute of Physics are doing to meet those problems. Can anything further be

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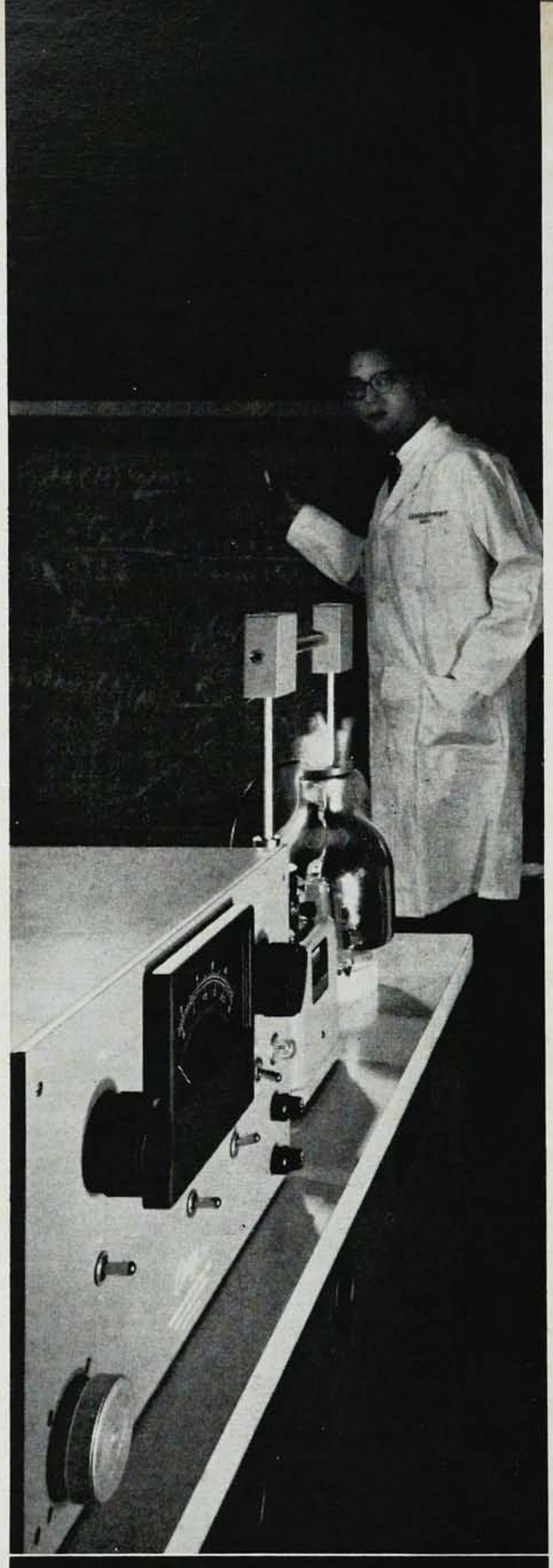

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been recommended that an advisory body of high-energy physicists be established to review membership and evaluate the operation from time to time to see whether the objectives of PIE are being met. To initiate PIE I have agreed to serve as ad hoc chairman of the advisory group, pending formation of such a group from the membership.

One of the important characteristics of PIE is that it would involve essentially no capital investment, permanent overhead or new personnel. (The duplication of preprints is planned on machines already in use by AEC.) For this reason it is proposed that PIE operate for an experimental period of six to twelve months, after which it could be evaluated objectively without the pressure that is often felt if the discontinuation of a program involves loss of capital investment and dismissal of personnel. PIE is a truly reversible experiment.

In an excellent article in the February 1966 issue of the *Bulletin of the Atomic Scientists* ("On Improving Communication among Scientists") Dean Don R. Swanson of the University of Chicago makes it amply clear that the sole object of improved communication services is improved communication among those who use them. Hence any program in this direction must be geared to the actual communication patterns of the working scientist. It seems evident that informal communication through preprints is such a pattern—one that has evolved through a real need. It is now time, as Swanson points out, to take this haphazardly evolved pattern and bring to bear on it the potential advantage of organization and planning without damaging its assets, which have contributed to its success in the first place. This kind of organization, and only this, is the aim of PIE. ■

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done? To my mind the following suggestions offer far more constructive possibilities than PIE for improving orderly physics-research communication and are worth consideration:

• Experiment for a year with a strict limitation on preprint distribution. After appropriate notice to the physics community, the journals would refuse to consider for publication, on grounds of prior publication, any papers for which more than, say, 75 or 100 preprints had been distributed.

• If controls on the preprint system were deemed desirable, it might be worth considering the setting up of a document registry[5] to which authors could send preprints and other documents. The registry would assign an accession number to each document and would distribute a weekly list of receipts. This concept offers a number of possibilities for controls: a distinction could be made between preprints (intended for publication) and other documents; the list could be classified, with index categories supplied either by authors or by indexers; the list could indicate which preprints were available on request from authors; the accession numbers would provide a truer picture of priorities than the artificial dates one finds on many preprints; the registry could coöperate with journals in converting preprint references in papers accepted for publication to journal references whenever possible (the phasing out of preprint references could be even more effective in future computerized information systems).

• Experiment with setting up one or more groups modeled after the biology system—small groups interested in a narrow specialty.

Other constructive ideas may be proposed by physicists interested in improving physics communication.

In conclusion, let the physics community experiment with new ideas and techniques to improve controls and strengthen orderly communication—not with techniques that dilute orderly communication and add confusion. Let us not make obscurity, incompleteness, polemics, inadequate referencing, discursiveness and irresponsibility the norm for physics-research communication. Let us not try to solve the problem of a leaky dike by removing the dike. ■

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