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Ministry of Science and Information Society Technologies

Good scientific research practice

Recommendations

Prepared by the Scientific Ethics Unit
of the Ministry of Science and Information Society Technologies
Approved by
State Committee for Scientific Research, 4th Term of Office

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The Scientific Ethics Unit, an opinion-making and advise-giving body of the Minister of Science and Information Society Technologies – Chairman of the State Committee for Scientific Research and of the State Committee for Scientific Research was established in 1998 and is established each time for the duration of the term of office of the State Committee for Scientific Research. The rationale for establishing the Unit was the need to protect the quality, integrity and the reputation of science which paves the way for the world's development in the 21st century, and the awareness that scientific misconduct poses the largest internal threat to science today.

The Unit was given a mission to formulate opinions and conclusions on issues concerning the ethics of scientific research, including specific violations of the ethics by the scientists.

One of the most important tasks of the Unit was to prepare a document that would constitute the basic point of reference to the issue of scientific misconduct, presenting the principles of proper conduct which would be easily understood and could be implemented by various institutions.

The first version of the text titled "Good Scientific Research Practice, Recommendations" appeared in the fall of 2000. The text was published in 2001 in "Sprawy Nauki", "Forum Akademickie" and on the website of the State Committee for Scientific Research, in the hope of inciting a public discussion on this issue. Unfortunately, the scientific community did not seem to be interested and the Unit did not receive any comments to the document. Hence, it was presented to the Stae Committee for Scientific Research for approval on June 16, 2003 in a practically unchanged version and the final version was sent to the Minister of Science and Information Society Technologies on May 25, 2004.

"Good Practice" constitutes an important element of forming appropriate ethical attitudes in science. It provides definitions that are important to this issue and presents not only clear rules fostering integrity of scientific work but also procedures to be followed in the event of an alleged misconduct. We believe that implementation of these rules and procedures by scientific institutions, as was done in other countries, will be an important step towards improving the quality and reliability of research.

This document deserves to be recommended to the entire scientific community.

Jan Krzysztof Frąckowiak, Ph. D.

Misconduct and dishonesty frequently accompany human activity and also pertain to scientific research. High reliability standards and proper observation of the scientific values system must constitute an inseparable attribute of scientific work, the main inspiration of which is the search for truth and sharing of that truth with others. The scientific system is particularly sensitive to dishonesty because, while conducting research, we still rely on the testimonies of others, meaning that we should trust them. The problem is of crucial importance not only to the internal cohesion and credibility of science but also to the maintenance of its social authority. It should also be pointed out that a doctrine seems to dominate among the opinions expressed in other countries which assigns particular significance to scientific misconduct financed with public funds.

As the history of scientific research shows, science has extraordinary self-correcting capabilities which protect it against the consequences of errors and misconduct, which, however, often takes quite a long time (as was the case with the *Piltdown Man,* where the hoax was discovered 40 years later). These capabilities do not constitute a sufficient protection against civilizational and social consequences of scientific misconduct, which may contribute ad hoc to promoting modern barbarism.

Contrary to frequent opinions, this phenomenon should not be underestimated. Although the *Office of Research Integrity* in the USA was notified of only 180 cases of misconduct in 2003[1], which constitutes approx. one per mille of the projects being financed, and the allegations are confirmed only in very few cases, structural aspects of universities, as has been observed by C. K. Gunsalus[2] , cause top scientists to minimize the existence of problems and to ignore the possibilities of misconduct that are inherent in research. Moreover, it is also believed that only drastic cases are disclosed, whereas less significant ones, by no means less harmful, go unnoticed, and sometimes less prominent laboratories seem not to care about or even tolerate them. Thus, what we see is only the tip of the iceberg. It should be emphasized that it does not matter whether the probability of occurrence of scientific misconduct is one to a thousand or one to a hundred thousand. The probability of a house being struck by lightning is also not significant: regardless of this probability, each house should be equipped with a lightning arrester – because if the house is hit, the damage will be extensive.

A temptation for a large as well as small scientific misconduct appears in systems where the basic criterion of assessing scientific institutions is their productivity, research is the subject matter of financial contracts, and the desire to be successful and pursue one's own career becomes the driving force for many individuals. This problem was initially identified in natural sciences and the awareness of this threat gradually spread to all areas of science. The research community's discussion on this matter was started in the 1970s in many countries and gained publicity in the late 1980s in connection, inter alia, with the publication of the case of David Baltimore[3].

Disclosed cases of plagiarism draw particular attention from the general public. However, cases of misconduct related to falsification of research results are much more dangerous to science and its structures than plagiarism, which is easier to detect. It should be

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[1] *Newsletter O. R. I.,* March, 2004

[2] C. K. Gunsalus, **"Rethinking Unscientific Attitudes About Scientific Misconduct"** *The Chronicle of Higher Education*, Mar. 28, 1997, p. B4.

[3] Daniel J. Kevles, **"The Baltimore Case"**, Norton, 1998

emphasized that in free societies - especially among the academics where creativity and individual ideas constitute a well-cherished value that must not be stifled - it is not completely possible to prevent the rules from being violated by individuals. Hence, the expectation that science can be protected against pathology is unrealistic. On the other hand, though, it is necessary to create an atmosphere promoting meticulousness and observance of high standards, without hampering the scientists' productiveness and creativeness[4].

An additional unsolved problem of the borderline between academic freedom and scientific misconduct appears here - in the context of a permission to pursue various types of parascience in some of the scientific institutions as well as acceptance of trashiness and apparentness of scientific research, which have nothing in common with reliable research processes. A conflict between the social interest of guaranteeing high standards of scientific research and the independence of scientific institutions as well as a conflict between the global nature of science and the national character of scientific institutions appear here, which are hard to solve.

That is why all civilized countries have recently introduced systems which, on one hand, try to prevent possible misconduct by creating an appropriate atmosphere requiring that the rules of good scientific practice be observed and, on the other hand, lay out the procedures to be followed should these rules be breached. It is commonly believed that in the social interest as well as in the interest of science itself and its social authority, all issues concerning alleged cases of scientific misconduct must be thoroughly and properly examined and solved.

These facts caused each university and each federal scientific institution in the USA to introduce elaborate rules of good scientific practice and procedures to be followed in the event of a misconduct. Matters are similar in Great Britain and Australia. In Europe such rules are being introduced very quickly[5].

In Poland this problem was recognized relatively early, as evidenced by the establishment of the Ethical Committee Supervising Research on Humans at the Ministry of Health and Social Welfare in 1982 and local Ethical Committees at Academies of Medicine and certain higher education institutions, followed by the establishment of the Committee on Ethics in Science at the Polish Academy of Sciences and the Committee on Ethics in Medicine at the Polish Academy of Arts and Sciences in 1992. These bodies are only opinion-making and opinion-giving bodies and are not authorized to apply sanctions. Numerous public discussions and conferences were held in recent years during which numerous issues related to ethics in science were discussed. In spite of this, these problems are disregarded and neglected by a significant portion of the scientific community, and in general terms, the community is not prepared to deal with them. The discussion in the media has been limited so far to cases of plagiarism. The situation is made even worse by the organizational system of our laboratories, which leaves a lot to be desired. Moreover, in contrast to other countries, we do not have appropriate structures to deal with the problem, and usually unprofessional disciplinary commissions existing at universities and other scientific institutions are not substantively prepared to deal with extremely complex cases of scientific misconduct. Furthermore, relativization of values ("what is not forbidden by the law is legal"), as well as general abuse of elementary principles of honesty and social acceptance of smaller misdemeanours inherited after Communism find their reflection in science.

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[4] e.g. *The Maintenance of High Ethical Standards in the Conduct of Research, Association of American Medical Colleges*

[5] e.g. DFG document: *Recommendation of the Commission on Professional Self regulation in Science*, Jan. 1998,
similar works *The Max Planck Society*, *The Danish Committee on Scientific Dishonesty* (1992) or the *Decree on the Research Ethics Council issued by the Finnish government* (1991)

1. Definitions

So far the most succinct and precise definitions concerning scientific research have been developed by the US *National Science and Technology Council* and presented in the document called "*Proposed Federal Policy on Research Misconduct".* The document was published in the fall of 1999 by the *Office of Science and Technology* established by the President of the United States, and refers to federal research agencies. This document states that:

- **Scientific misconduct** means actions against scientific ethics involving fabrication, falsification, or plagiarism in applying for funds, in performing or reviewing research, or in reporting research results.
- **Fabrication** is making up results and recording or reporting them.
- **Falsification** is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research results are not accurately represented in the research record.
- **Plagiarism** is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit, including those obtained through confidential review of others' research proposals and manuscripts.

Pursuant to these definitions, objection against scientific misconduct does not question the scientist's right to make an unintentional mistake or to express honest differences of opinion.

These definitions, which exemplify but do not fully exhaust the list of threats to scientific reliability, constitute an approval of the policy adopted by the US a dozen or so of years ago. According to internal by-laws of some universities (such as the University of Maryland), failure to let appropriate authorities know about a discovered case of misconduct, unjustified accusation of another person of misconduct as well as hiding or destroying evidence in cases of misconduct are also considered to be acts of scientific misconduct.

Although the definitions used in other countries do not differ significantly from those adopted in the US, introduction of a consolidated, global definition of scientific misconduct poses a problem. What is problematic is the establishment of a clear borderline between scientific misconduct and crimes or offences dealt with by the courts (defined in the given country's penal codes, codes of civil procedure, intellectual property rights, etc.), violations of discipline decided by disciplinary courts or cases of arbitration by one's own peer boards. Moreover, when ruling in cases related to scientific misconduct, the need arises to take into account the specifics of each discipline: one may, for instance, point out specific problems associated with research on humans where the scientist's sense of responsibility becomes really important.

Each country has different procedures that it follows in cases of scientific misconduct. Two basic models can be distinguished: leaving the cases to the competencies of scientific institutions (the US model) or transferring them to the competencies of government institutions (Danish model). It seems that adoption of one of these solutions depends on the size of the scientific community. The Danish model seems more practical if the size of that community is small. It should be pointed out that even in the case of the US model the most serious cases are dealt with in the end by federal agencies (*such as the Office of Research Integrity*).

2. Rules of good scientific research practice.

The need to develop a Code of Scientific Ethics has been raised for many years in various scientific communities, including Poland. The most sensible stance in the discussion on this issue was taken by the *American Association for the Advancement of Science*[6] when Prof. John Ladd from Brown University said: "***Professional code of ethics*** *is a misnomer. What scientists really mean to say – what they really want – is a* ***professional code of conduct".***
The definition of **good research practice**, i.e., definition of such rules of professional conduct which are commonly understood and possible to be implemented at various institutions, constitutes the most important element of addressing the issue of scientific misconduct. The guidelines of good practice should include precise definitions and transparent **rules** and **procedures** in cases of allegations of scientific misconduct which are agreed on and accepted by the community.Every scientist should be aware right from the start of his career of the consequences of violating the adopted rules.

When commencing work in Poland on the development of the rules of good scientific practice and appropriate procedures, one should take into account the past work done in other countries. In the context of Poland's accession to the EU, particular emphasis should be placed on the decisions and documents of European organizations[7]. Practical reasons (increased importance of EU financing) make it necessary to unify the approach. There is no doubt that it will become necessary to apply identical rules in all of Europe in the near future. Although the approach to the problem is similar in various European countries and, in principle, complies with the previous decisions made in the USA, agreeing on a joint text is not easy. Despite this, it seems that, as regards Poland, efforts should be rather focused on adjusting our laws to the laws being introduced in Europe (taking into account legal sovereignty) than on creating systems from scratch.

The responsibility for preventing scientific misconduct lies with the scientific community as a whole, i.e. with the participants in the research processes (students, postgraduates, employees and managers of research teams and institutions), with scientific institutions (schools, institutes, scientific associations and organizations) and with government and non-government agencies involved in science. To fulfil this responsibility, competent institutions should appropriately educate their employees, and should develop a system fostering observance of the rules.

The basic institutions with which the responsibility for making sure that good scientific practice is observed should lie are institutions authorized to grant degrees and diplomas in research. This ensues from a belief that a very high probability of it being detected at the early stages of scientific career and public presentation of the research results is the best method of preventing scientific misconduct.

All the previously mentioned general guidelines and procedures developed by various scientific organizations name the following, basic attributes of good scientific practice:

1. Observation of the basic rules of scientific work, such as:
- adequacy and standardization of methods,
- thorough documentation of results,
- scepticism towards one's own results,

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[6] AAAS Professional Ethic Project, Publication 80-R-4 1980

[7] e.g.: *Safeguarding Good Scientific Practice, A joint statement by the Director General of the Research Councils*
and the Chief Executives of the UK Research Councils, 18 Dec. 1998, DFG document: *Recommendation of the Commission on Professional Self Regulation in Science*, Jan. 1998., *Guidelines for the Prevention, Handling and Investigation of Misconduct in Science* published in 1994 by the *National Research Ethics Council of Finland*
or the *Guidelines* project developed by the *European Science Foundation* and others

- honest and due recognition of involvement of co-workers, competitors and predecessors,
- honest assessment of others.

It is recommended that all institutions involved in science develop and disseminate internal codes of good scientific practice. These codes should be accepted by these institutions' communities and constitute a binding obligation for the employees. They should be simple and easy to understand and should be a part of the employees' education. As regards the institutions granting funds, it should be made sure that all those participating in the process and the reviewers be aware of the responsibility lying with them in connection with the confidentiality of the procedures and objectivism in their evaluations. They should also bring to light any personal and institutional conflicts of interest.

2. Proper management and cooperation in research teams;

The institution's management and individual scientists are responsible for creating an appropriate atmosphere fostering good scientific practice. Responsibility for this should be precisely defined at each level. A principle of responsibility of the institutions and their bodies for the honesty of information provided in applications for financing should be introduced. Internal procedures should make it possible to establish independent, external bodies should allegations appear that good scientific practice has been violated.

3. Special consideration of the needs of young researchers;

Education and the development of proper attitudes among young scientists constitutes a particularly important element of the system. The institutions should specify relevant rights of the "masters" and rules of responsibility for educating young scientists in their internal by-laws and should make sure that they are abided by. Particular attention should be paid to the responsibility of PH.D., M.Sc. and licentiate promoters. Every member of a research team must have a senior, experienced partner responsible for the trainee's scientific development.

4. Securing and maintaining research results.

The research results should be based on verifiable evidence. The scientific institution's management and employees are responsible for safekeeping of adequately detailed and precise initial results of research as well as other documentation concerning their work. Permanently saved and appropriately described data must make it possible to trace the research path leading to the results. It is recommended that all scientists maintain and keep personal records of their research. It is recommended that aggregated data be kept for several years (8 years in the US) by the research department or institution in which they were produced. "Data" means initial results on which publications were or will be based, including samples or materials in certain cases. Lack of these data in the case of an allegation of scientific misconduct should be treated as aggravating circumstances.

5. Observance of copyrights of the scientific publications.

The minimum criterion of co-authorship is participation in developing a research concept, in performing the research, in interpreting or preparing publications in the co-author's field of specialization, at least to the extent which is sufficient for him to be publicly liable for it. If there are two or more authors of a publication, one of them - at the consent of others - accepts formal responsibility for the entire publication. Signed declarations of authorship or co-authorship, including a statement that there are no other persons who might claim co-authorship, are kept by the institution's manager. "Honorary" co-authorships are not allowed. Activities, which in other cases are important to scientific work, like seeking funds, providing materials, educating co-authors on the application methods, collecting and processing of data, or managing an institution at which the research is being conducted, do not constitute the grounds for co-authorship. Participation of persons other than "co-authors" in a publication must be appropriately marked (usually in the credits).

6. Avoiding conflicts of interest

Conflicts of interest may occur in particular:

a. When evaluating others – institutions, people, projects, conclusions, work, etc.:

- when the evaluator is linked to the institution being evaluated.
- when a member of a body granting funds is linked to the institution to which the funds are being granted.
- when the evaluation can be affected by circumstances other than an objective, substantive and competent analysis; this occurs most frequently when the evaluator or persons closely related to him will benefit from the given result of the evaluation.
- when the evaluation alone, regardless of its results, leads to benefits, and the evaluator does not have sufficient competencies to perform the analysis correctly.

b. As regards one's own scientific work, a conflict of interest may occur if a person employed by the institution conducting research on behalf of business organizations or in the field of technology transfer runs a business on his/her own or is a shareholder in the enterprise in the area of his/her own competencies, and in particular:

- when the financial ties between the researcher and the sponsor of that research may lead to bias in that research or in reporting the results,
- when a given result of the work may cause the performer or persons closely related to him to derive extra benefits (apart from regular remuneration),
- when the work alone, regardless of the results, causes the performer or persons closely related to him to derive benefits (e.g. employment or contract work) while lacking sufficient competencies to perform this work correctly,
- when equipment, materials or services needed to conduct the research are purchased from companies with which the researcher or persons closely related to him have financial, ownership or managerial ties,
- when using the work performed by students, postgraduates or other inferiors or the institution's equipment to perform work for a company with which the researcher or persons closely related to him have financial, ownership or managerial ties.

A particular case of a conflict of interest is a conflict of commitments, i.e. a situation where the ties between the researcher and the research sponsor or licensee, or other external commitments (didactic, scientific, social and organizational, public, etc.) cause him to neglect his commitments towards his mother institution.

Should circumstances indicating a possible conflict of interest or conflict of commitments appear, the scientists are obliged to present the problem to the institution's management so that the problem can be resolved or potentially conflicting actions called off.

3. Procedures

To enforce the adopted rules of good scientific practice, it is necessary to establish precise procedures to be followed in the event of an alleged violation of these rules which define the consequences ensuing from the confirmation of these allegations.
Parties that can participate in the procedure related to the alleged scientific misconduct include:

- persons making an allegation of misconduct in good faith (*whistleblowers*);
- the suspect, i.e., a person whom the allegations concern;
- persons cooperating with the suspect;
- periodicals, in which articles suspected of containing texts resulting from misconduct have been, or are set to be, published;
- agencies financing research being conducted by persons or teams charged with misconduct;
- in extraordinary cases (such as drug research) – also society.

Pronouncement of scientific misconduct, such as it is defined, for instance, in the aforementioned document *"Proposed Federal Policy on Research Misconduct"*, requires that:

- a significant deviation from the practice of maintaining the integrity of research protocols accepted within the given scientific community be determined;
- misconduct be performed consciously or intentionally or by grossly neglecting the adopted rules;
- the allegation be confirmed by unquestionable evidence.

To hold proceedings aimed at solving the case, each scientific institution should have an appropriate procedure in place, defined in its charter or appropriate internal by-laws, compliant with the common law.

Procedures in the event of an allegation of scientific misconduct contain the following common elements, with various levels of detail, depending on whether it is a general document or detailed by-laws of the institution conducting the research:

1. **Definition of scientific misconduct**, taking into account the specifics of the research being conducted by the institution.
2. **Manner of reporting allegations of scientific misconduct,** including indication of the jurisdiction (as part of the scientific institution's management), to which the allegation is being reported. As regards higher education institutions, the competent person is the president, and as regards scientific institutions, it is the director; these persons make the decisions to commence explanatory proceedings and set the dates by which each stage of the procedure is to be completed. The management also specifies penalties and sanctions in accordance with the institution's by-laws. If the conflict of interest occurs at the management level, then it should be reported to a manager of higher jurisdiction.
3. **Strict confidentiality of the proceedings**, constituting an extremely important criterion of maintaining the highest standards of the procedure; restricting the number of people informed about the proceedings and their responsibility; proper protection of documentation.
4. **Explanatory proceedings**, the aim of which is to determine whether commencement of an investigation is justified. In this case the institution's manager appoints a person from among the management and specifies this person's responsibility for gathering initial information and for securing the evidence. The accused should be informed immediately about the commencement of the proceedings and should be allowed to present clarifications and to seek legal assistance. The name of the accusing person must not be disclosed at this stage. The explanatory proceedings should be concluded with a confidential report which should include the decisions and recommendations on how to proceed in the case. The accused receives a copy of the report. Should the institution's manager determine that the allegation of misconduct is unsubstantiated although the accusation was made in good faith, the proceedings will be concluded at this point and the parties will be informed. The accused should have the right to request that the fact that he/she has been cleared of the accusations be announced publicly. However, if the institution's manager determines that the accusations were not made in good faith, he takes appropriate disciplinary measures towards the person making the accusations. If he determines that the explanatory proceedings justify the accusation, he appoints an appropriate investigation commission to deal with the case.
5. **The investigation** is being conducted by the Investigation Commission, the aim of which is to determine whether the alleged misconduct actually took place. The Investigation Commission should include persons having appropriate knowledge and authority, including persons from outside of the institution if necessary, such as lawyers. It should be made sure that the Commission's members are not persons having relations with the accused or the accusing person or running the risk of being involved in a conflict of interests. The institution's manager informs in confidentiality the manager of the agency financing the research. The procedure should specify in detail the rules, according to which the investigation will be conducted, which, although it is not of legal nature, must comply with all current regulations, especially those relating to the rights of the parties. At this stage of the procedure the accused should be confronted by the person making the accusation. The Commission should be obliged to finish its work within a specific period of time that should be as short as possible (usually not longer than 120 days). A confidential and detailed report from

the investigation is presented to the institution's manager, the accused and the agency financing the research. In principle, the report may contain one of three decisions: (1) fraud has been ascertained; (2) gross violation of the rules of scientific research practice but no fraud has been ascertained; (3) no fault has been ascertained.

6. **Sanctions**. If the Investigation Commission verifies the allegations, the institution's manager applies disciplinary sanctions towards the person whose guilt has been proven. These sanctions or penalties should correspond to the extent of the fault and should comply with the institution's by-laws. In particularly drastic cases the manager may resort to penal or civil law. He takes similar measures with respect to a person making the accusation if he finds out that this person acted mischievously or in bad faith. A person that made unconfirmed accusations in good faith should be protected. The findings of the investigation are announced publicly by the institution's manager, also if the accused is not found guilty.
7. **Appeal procedure,** the commencement of which should be related to the presentation of new evidence in the case. A rule could be adopted in Poland that the highest instance of appeal is the Committee on Ethics in Science or another high-level body appointed to deal with such cases. After reviewing the appeal, the Committee would sustain the ruling or have the case re-examined.

4. Proposals

Introduction of the rules of good scientific practice in Poland should be comprised of the following, recommended stages:

1. **Publication of a high-level document called, for instance, "Guidelines for good scientific research practice"**, which would refer to the entire scientific community, specify the objectives, general definitions and rules of good scientific practice as well as a general outline of the procedure to be launched should these rules be violated. This document, based on these recommendations, should also specify the consequences of properly proven violations of the rules to the extent lying within the government's competencies[8]. Possible consequences might include, for instance, limited access to public funds, limited rights to grant scientific degrees and titles, etc. This document should also specify clear and easily understandable frameworks of the rules, procedures and levels of responsibility which will be introduced at scientific institutions in a manner corresponding to the given disciplines or research areas and binding on all persons associated with these institutions. The system of good scientific practice created in this way should become an element of education and preparation of young scientists for work. Before being published, the document should be thoroughly discussed by the scientific community and appropriate decisions should be taken. The final version of the document should be prepared within a year. The body responsible for preparing the document could be the Scientific Ethics Unit established by the Minister of Science.
2. **Giving the necessary momentum to the process of developing procedures at scientific institutions**. This can be done, for instance, by introducing a provision that institutions which during a period of 2 years, for instance, from the moment the "Guidelines for good scientific research practice" are published, do not implement the recommendations and procedures specified in those guidelines, will no longer qualify to receive grants and their category will be reduced. Agencies granting funds to finance research should clearly lay out in their by-laws the rules of good scientific

[8] Zdanie w wersji polskiej jest dla mnie niezrozumiałe, więc nie mogę sparafrazować zdania w wersji angielskiej, które też jest niezrozumiałe.

research practice specific to the disciplines financed and the consequences of violating these rules, especially the financial consequences. Rigorous observance of the rules of good scientific practice should constitute one of the basic criteria of giving various accreditations or certificates to laboratories. To make it easier for the scientific institutions to develop appropriate procedures model documents should be drawn up and published.

3. **Performance of recommendations.** In order for the system to work well, it seems necessary to authorize it through legislation and to establish a nation-wide jurisdiction which would monitor the practical observance of the rules of good scientific practice in all areas of science. The monitoring institution would also act as the reference and appeal body.