INTERNATIONAL ATOMIC ENERGY AGENCY

NUCLEAR DATA SERVICES

DOCUMENTATION SERIES OF THE IAEA NUCLEAR DATA SECTION

IAEA-NDS-2xx
April 2010

NRDC Protocol
(Protocol for Cooperation between the Nuclear Reaction Data Centres)

Draft edited by

Svetlana Dunaeva and Naohiko Otsuka
IAEA Nuclear Data Section
Vienna, Austria

based on earlier work by

Victoria McLane
National Nuclear Data Center
Brookhaven National Laboratory, USA
and
Otto Schwerer
IAEA nuclear Data Section
Vienna, Austria

Issued on behalf of the
International Network of Nuclear Reaction Data Centres

Abstract: EXFOR and CINDA are the exchange format for the transmission of experimental nuclear reaction data and bibliography between national and international nuclear data centers for the benefit of nuclear data users in all countries. This report contains the protocol for cooperation in compilation of EXFOR and CINDA.

Nuclear Data Section
International Atomic Energy Agency
P.O. Box 100
A-1400 Vienna
Austria

e-mail: services@iaeand.iaea.org
fax: (43-1)26007
telephone: (43-1)2600-21710
web: http://www-nds.iaea.org

Note:

The IAEA-NDS-reports should not be considered as formal publications. When a nuclear data library is sent out by the IAEA Nuclear Data Section, it will be accompanied by an IAEA-NDS-report which should give the data user all necessary documentation on contents, format and origin of the data library.

IAEA-NDS-reports are updated whenever there is additional information of relevance to the users of the data library.

For citations care should be taken that credit is given to the author of the data library and/or to the data center which issued the data library. The editor of the IAEA-NDS-report is usually not the author of the data library.

Neither the originator of the data libraries nor the IAEA assume any liability for their correctness or for any damages resulting from their use.

96/11

Citation guideline:

When quoting EXFOR data in a publication this should be done in the following way:

"A.B. Author et al.: J. Nucl. Phys. 12,345, (1979), (EXFOR-12345.002)"

Table of Contents

(Blank page)

INTRODUCTION

The general scope of the Nuclear Reaction Data Centres (NRDC) exchange is all experimental microscopic nuclear reaction data. Modifications to the general scope of the data exchange can be adopted only as a result of an agreement between the "Core" Centres of the NRDC.

The Core Centres will be defined by NDS based on contributions to network and user service capabilities. The currently defined Core Centres and their respective service areas are:

- The National Nuclear Data Center (NNDC) services the U.S.A. and Canada.
- Nuclear Energy Agency Data Bank (NEA-DB) services its member countries.
- The Russian Nuclear Data Centre (CJD), services the countries of the former U.S.S.R.
- The I.A.E.A. Nuclear Data Section (NDS) services I.A.E.A. Member States not included in the service areas of the above three Centres.

The working language of the Network is English.

The Nuclear Data Section (NDS) will be responsible for ensuring that data compilations and exchanges are done in an efficient, productive and timely manner. The role of NDS will be to:

- assign clear responsibilities for the creation and correction of data compilations, and drive these activities forward,
- ensure implementation of compilation rules,
- decide on all issues relating to dictionary codes,
- be responsible for CINDA and EXFOR distribution to the other data Centres,
- be responsible for central EXFOR Web Service and EXFOR-master file central storage.

EXFOR PROTOCOL

Data files are exchanged regularly between the Nuclear Reaction Data Centres (NRDC) in the EXFOR format in accordance with the conventions laid down in the EXFOR Exchange Formats Manual.

NDS will maintain and distribute the EXFOR Master file.

All matters that affect EXFOR, in general, must be agreed to by the Nuclear Reaction Data Centres. Final decisions on proposals concerning compilation rules and new quantities can be made with Core Centres agreement after discussions among all Centres. NDS will be the final arbiter in case the Core Centres are unable to reach a decision.

All free text comments within all EXFOR entries shall be in English.

Scope of compilation

While the general scope of compilation is all experimental microscopic nuclear reaction data, the NRDC network may divide the scope into the following categories:

A) Data types which must be compiled,
B) Data types which may be compiled on a voluntary basis and are exchanged within the regular transmission files,
C) Additional data types which may be transmitted only on separate transmission files using different Centre identification characters.

The definitions of categories A, B and C must be agreed by the network, and all Centres must define and announce their compilation scopes for categories B and C to the network.

The current definitions are given in Appendix A of this Protocol.

Data Compilation Responsibility

NDS will assign areas of responsibility for data compilation. If a Centre, assigned to a particular area of compilation (*e.g.*, neutron data from a country or countries), is not carrying out their responsibilities, *i.e.*, compiling all new data for that area in a timely manner, the NDS coordinator will reassign all or part of those responsibilities to another volunteer Centre[1].

[1] As a consequence, the obligatory link between the geographical area of the Institute and the accession number, which has been in force for neutron data, may now be lifted for all data.

An area of compilation may be for a given projectile or set of projectiles, for a given country or group of countries, for a given data type or data types, or for any combination of these.

A Centre responsible for an area of compilation may agree with another network Centre to share the compilation work for that area on a regular basis. However, the responsibility for coverage and quality of the compilation remains with the responsible Centre. The currently assigned EXFOR compilation responsibilities are given in Appendix B of this Protocol.

If a Centre has a need for a particular data set to be compiled immediately, the Centre should send a request to the responsible Centre with a copy to NDS. If the responsible Centre cannot compile the data in the time needed to meet the requirements of the Centre making the request, that Centre making the request can compile the data after informing both the coordinating Centre and responsible Centre.

For corrections to entries of another Centre in agreement with responsible Centre, entries of different accession number areas may be transmitted on the same TRANS file.

Neutron, charged-particle, and photonuclear reaction data must be compiled in separate entries, with appropriate identification, even if they are reported in the same publication.

All corrections to entries must start from the EXFOR Master file central storage (rather than from local versions).

Recompilations or improvements of existing entries should result in an update of the old ENTRY (rather than deletion of the old ENTRY and creation of a new ENTRY).

NDS shall keep an archival copy of the latest version of each of the EXFOR entries and shall be ready to provide the data to any Centre should it be required.

If two Institutes from different service areas are involved, the primary Institute defines the Centre responsible (see **LEXFOR, Institutes**, for definition of primary Institute).

If several institutes of different service areas are involved, the following rules determine the compilation responsibility:

1. The institute of the facility used, if at least one author is from this institute.
2. If an itinerant group used the facility, the main investigator of this group determines the Centre responsible.
3. If facilities of different laboratories from different service areas are used, the Institute from which it is most likely to obtain further information on the experiment should determine the Centre responsible. This will normally be the corresponding author, or, in case of doubt, the first author of the publication.
4. If separate experiments from different service areas with clearly separated results are reported in the same paper, the results should be compiled in separate entries. This separation is obligatory for different projectile types (neutron, charged particle, photon). In all such cases cross references to the other ENTRY must be given.

A Centre wishing to compile recently published data (C1) will contact the Centre in whose area of responsibility the data were produced (C2), with copy to NDS, with a list of the data sets to be compiled. C2 will inform C1, as quickly as possible, with copy to NDS, whether the data either have been compiled or are in the process of being compiled by another Centre.

If the data are not compiled or being compiled, C2 will either agree to compile them with priority, or ask C1 to compile the data and include it in the next regular C1 transmission file.

The Centre wishing to compile old data should:

1) notify NDS of the data sets that they intend to compile;

2 NDS will check that the data set has not been compiled, and is not being compiled by another Centre, and will let the originating Centre know if they may go ahead with the compilation. All Centres are responsible for checking that the data sets transmitted by them do not duplicate existing data.

Neutron Reaction Data Compilation.

The responsibility for the collection, compilation, transmission and dissemination of neutron data information is shared among the four major neutron data compilation Centres, each being responsible for a defined service area.

Within the scope of this protocol each Centre is expected to compile the data measured in its service area as fast and as thoroughly as possible. If two Institutes from different service areas are involved, the primary Institute defines the responsible Centre. See **LEXFOR, Institutes** for definition of primary Institute.

Where the primary institute is not clear, the Centres concerned should consult each other before compiling the data in order to avoid duplicate ENTRY of the same data.

An effort must be made to compile all neutron reaction data published after 1 July, 1970. Earlier data will be compiled as time permits.

All matters concerning the exchange of neutron data must be agreed to by the four Core neutron data Centres.

Charged-Particle Reaction Data Compilation.

The responsibility for the collection, compilation, transmission and dissemination of charge – particle data information is shared among the compilation Centres, each being responsible for a defined service area (see Appendix B).

- National Nuclear Data Centre (NNDC): for the United States and Canada,
- Hokkaido University Nuclear Reaction Data Centre (JCPRG): for Japan,
- Russian Nuclear Structure and Reaction Data Centre (CAJaD): for countries of the former Soviet Union, except Ukraine, and for compilation of entries from countries not covered by other Centres after coordination with NDS;
- IAEA Nuclear Data Section (NDS): for all countries not covered by other Centres.

Photonuclear Reaction Data Compilation.

The following nuclear reaction data Centres have the responsibility for the collection, compilation, transmission and dissemination of photonuclear data information from their respective countries (see Appendix B).

- National Nuclear Data Centre (NNDC): for the United States and Canada,
- Hokkaido University Nuclear Reaction Data Centre (JCPRG): for Japan,
- The Centre for Photonuclear Experiments Data (CDFE): for countries of the former Soviet Union, except Ukraine, and for compilation of entries from countries not covered by other Centres after coordination with NDS;
- IAEA Nuclear Data Section (NDS): for all countries not covered by other Centres.

For photonuclear data there is no requirement for completeness except for photoneutron and photofission data.

EXFOR Transmissions

Assignment of Accession Numbers.

The methods of assigning accession numbers may be different at each Centre. That is to say, a Centre may assign them manually or automatically (by computer). A Centre may assign legal EXFOR accession numbers only to works within its agreed area of responsibility. Where the responsibility for compiling a given data set is not clear, the Centres concerned should consult each other before compiling the data in order to avoid duplicate ENTRY of the same data. (See **LEXFOR, Institute**).

Procedure for transmitting new exchange files.

The originating Centre deposits new exchange files on the NDS open area, subdirectory TRANS.PRELIM,[2] and notifies the other Centres. The other Centres will have one month to suggest modifications to the file.

As soon as possible after the month has passed, the originating Centre should:

1. Either make any suggested modifications to the file, or notify the other Centres why the modifications have not been made.
2. Deposit the corrected file in the NDS open area, subdirectory TRANS,[3] and notify the other Centres.
3. Request NDS to delete the preliminary version from the NDS open area.

NDS may correct or assign volunteers to correct preliminary transmissions that are not corrected and resubmitted as final transmissions in a timely manner, and will be responsible for distributing all final transmissions.

In general, it is the responsibility of the individual Centres to transfer the files from the NDS open area.

Procedure for files received with errors.

There are the following cases to be considered for files received with errors.

[2] Suggested naming convention: PRELIM.*nnnn*, where *nnnn* is the file identification number.
[3] Suggested naming convention: TRANS.*nnnn*, where *nnnn* is the file identification number.

1. If a file can not be physically read, in part or whole, then the originating Centre should be requested to send another identical file, which should be done with minimum delay.
2. If there are errors (format, structure, *etc*.) in one or more entries, then the originating Centre should be notified of the errors by e-mail with the usual Memo distribution.
3. Problematic entries which had to be removed from a preliminary transmission can be put into a special subdirectory of the NDS open area, TRANS.PROBLEMS. These entries will be reviewed by the other Centres and can be finalized at the next NRDC meeting.

Alterations to EXFOR entries ("Retransmissions").

Alterations to EXFOR entries are, in general, transmitted only by the originating Centre and are included in the regular EXFOR transmissions. However, retransmission of entries belonging to a Centre that is no longer active may be done by another Centre in agreement with cooperating Centres.

NDS can make trivial corrections directly on the common Master file (with agreement with originating Centre).

Serious corrections (for example, those involving the COMMON or DATA sections, or essential BIB keywords such as REACTION, MONITOR, *etc*.) should be transmitted as quickly as possible. Less serious corrections can be made and transmitted as workloads permit.

Notification of errors found in entries originating at another Centre should be communicated to all Centres. The NDS should make sure these corrections are done in a timely manner. If they are not, the coordinator will ask one of the other Centres to submit the corrected entries.

CINDA PROTOCOL

The CINDA2001 format shall be the method of exchange between the Nuclear Reaction Data Centres. The CINDA Formats Manual shall contain the coding rules for all CINDA exchanges.

NDS will maintain and distribute the CINDA Master file.

All matters that affect CINDA2001 formats, in general, must be agreed to by the Nuclear Reaction Data Centres. Final decisions on proposals can be made with Core Centres agreement after discussions among all Centres. NDS will be the final arbiter in case the Core Centres are unable to reach a decision.

The information compiled in CINDA shall consist of references to experimental nuclear reaction data and evaluated nuclear data libraries. The quantities to be entered shall be those that have been agreed upon for ENTRY into EXFOR and into the ENDF-formatted evaluated libraries.

Updates to the CINDA2001 formats must be agreed upon by the Core Centres.

Data Compilation Responsibility

NDS will assign responsibilities for CINDA compilation.

A subset of the Core Centres will be responsible for all CINDA Transmissions. That is, the NNDC will be responsible for the US and Canada, the NEA Data Bank will be responsible for its member countries, and the NDS will be responsible for the rest of the world. All other Centres compiling new references will transmit the data through one of these three Centres.

Updates sent by a Centre containing new entries and updates to entries that are the responsibility of the originating Centre shall be transmitted in a separate file (exchange file) from new entries and updates to entries that are the responsibility of another Centre. The latter shall be sent in reader files, separated by coordinating Centre. New blocks included on reader files shall have block numbers beginning with zero (0) and sequence numbers equal to zero.

CINDA Transmissions

A CINDA Transmission shall consist of the exchange file and one or more reader files.

The EXFOR Accession Number will, in general, be used as the CINDA block number (see EXFOR Protocol, page 4, for assignment of accession numbers).

The sequence number within a block shall be unique, *i.e.,* if a line is deleted, the sequence

number should not be reassigned.

The originating Centre shall deposit new CINDA transmissions on the NDS open area, subdirectory CINDA.

In the case where there is problem with updates to files of a given Centre, the NDS shall notify the original Centre before releasing the files. If the original Centre does not respond in a timely manner, NDS shall have the authority to produce transmission files for that Centre and release them to all data Centres.

In general, it is the responsibility of the individual Centres to transfer the files from the NDS open area.

CHANGES TO SCOPE, FORMAT AND CODING RULES OF CINDA OR EXFOR

No changes in the basic structure of CINDA or EXFOR will be allowed without NRDC agreement.

However, in particular the EXFOR format is continuously refined and expanded to include new types of data as the need arises. These refinements are introduced through dictionary updates, modifications of coding rules which may affect the formats or the file structure, or redefinition of the compilation scope.

Dictionary modifications or additions which appear to be trivial (inconsequential) will be added to the dictionaries as soon as possible after receipt, without formal approval procedures.

For all other proposed changes, it is the responsibility of the Centre originating the proposal to obtain NRDC agreement, following the procedure outlined below.

The following procedure should be followed by each of the NRDC members in obtaining the agreement for changes or revisions:

1. The initial proposal should be disseminated to all Centres. Wherever possible proposals affecting the content of the Manuals should contain proposals for specific wording to be inserted in the Manual. Adequate explanation and documentation to help in preparing LEXFOR entries should accompany any suggestions for additions to LEXFOR. Proposals for new dictionary quantity codes (Dictionaries 30-35, 236) should be supported by an expansion, a full explanation of its use and limits, a list of corresponding Dictionary 236 entries, and, where appropriate, a reference to the data for which the code will be used. All communications with regard to such proposals shall be in the form of Memos.
2. In the case where there is discussion on a proposal, the initiating Centre shall then collect and digest all comments, suggestions and counter proposals.
3. In this review, the initiating Centre shall consider all consequences which would affect the CINDA/EXFOR associated computer codes.
4. A change in CINDA/EXFOR will not oblige Centres to change existing entries (whether they have been transmitted or not) unless stated explicitly in the proposal and approved by the data Centres.
5. The initiating Centre shall then distribute a technical evaluation of alternatives to the other Centres.
6. After receiving the response to this technical evaluation:
   a) In the case of positive agreement, the initiating Centre shall submit a final proposal including all affected dictionary, CINDA Manual, EXFOR Formats Manual, and LEXFOR updates and mention which computer programs will need to be updated.
   b) If no positive agreement has been reached:
   - If the proposal implies a change in the basic structure of CINDA or EXFOR, or a change in the general scope, the proposal will be included in the agenda of the next NRDC meeting. In order to be adopted at an NRDC meeting, a proposal should be

sent out at least four weeks prior to the meeting date.
- In all other cases, NDS will seek to reach a consensus between the Core Centres, in which case the proposal is considered approved. If the Core Centres cannot come to an agreement, NDS acts as the final arbiter.

Whenever decisions are made at an NRDC meeting that require Manual changes, the dictionary and Manual updates should be prepared and sent out as soon as possible after the draft minutes are received. The minutes of the meeting should include either the proposed dictionary and Manual updates or a reference to the Memo(s) in which they are given.

DICTIONARY PROTOCOL

Routine transmission of Dictionaries.

The IAEA Nuclear Data Section (NDS) is responsible for the coordination and the updating of the EXFOR dictionaries. For this purpose, an archival dictionary file is maintained at NDS in a special archive format (see Dictionary Exchange Formats Manual).

Approximately every three months or whenever a major alteration is made, NDS deposit the corrected file in the NDS open area, subdirectory TRANS,DICTS, and notify the other Centres.

It is the responsibility of each Centre to verify that information is compiled in accordance with the latest version of the dictionaries.

Addition of new codes.

The cooperating Centres may propose new codes or any other dictionary alteration by means of Memos. A proposal for a new code should include any associated information needed for the dictionary, along with an explanation of its use, and, where appropriate, references to data sets for which the code will be used.

The Centre responsible for updating the dictionaries is also responsible for checking the consistency of proposed alterations with other codes and with the Manuals. Some latitude is allowed in the formulation of a final dictionary entry, but the meaning must not be changed without the approval of the originating Centre. In questionable cases, the other Centres should be consulted. The cooperating Centres are responsible within their respective areas for keeping the laboratory (Dictionary 3) and bibliographic reference code (Dictionaries 5-7) dictionaries up to date.

Consequential updates, in particular, changes to the codes in Dictionaries 1, 2, 4, 16, 24, 30-35, 37 and 236 have to be entered into the dictionaries only after approval by the Centres.[4] Also, alterations of EXFOR dictionary entries that entail changes to data already transmitted cannot be implemented without specific NRDC approval. A proposed dictionary alteration that appears to be trivial (inconsequential) has to be added to the dictionaries as soon as possible after receipt. NDS is the final arbiter for all decisions concerning dictionary codes.

If a Centre uses a new dictionary code in a data transmission prior to its inclusion in the relevant dictionary, the Centre must be prepared to correct the ENTRY and retransmit it, if the new code is not approved.

In general, a dictionary alteration becomes effective upon its transmission to the cooperating Centres.

[4] See section on Changes to Scope and Format of EXFOR

COMMUNICATION BETWEEN CENTRES

All changes in Protocol, compilation responsibilities, scope of compilation and communication procedures can only be made at the biennial NRDC meetings when Heads of Nuclear Data Centres are present.

All technical questions that require additional discussion or prove complicated to solve can be discussed at the annual NRDC meeting.

All recognized policy papers for consideration by the NRDC members need to be prepared and distributed four weeks before the annual NRDC meeting. This will ensure adequate thought and discussion prior to the meeting.

Discussion between cooperating Centres on the subjects of data compilation, the EXFOR system and its further development, EXFOR Manual and Dictionaries, and EXFOR transmission files, are undertaken by means of memos called:

- **CP Memos**: for the communication of proposals, programming details including collaboration in software and other general considerations related to the overall aspect of EXFOR. CP Memos are distributed to the cooperating Centres. Other compiling groups are informed, as necessary, by their Centre of contact. This series of memoranda is numbered as: Memo CP-*n/m*.
- **4C Memos**: for the communication of details dealing only with neutron data or other Four-Centre (non-EXFOR) matters. This series is numbered as: Memo 4C-*n/m*.

  For both series of memos *n* is the Centre identification character, and *m* the chronological memo number within the Centre.

Memos should conform to the following general rules:

- The memo should be headed by the memo number, the date, originating staff member(s), and subject.
- For memos covering more than one topic, all subjects should be listed separately, and the contents of the memo should be summarized on a covering-page. Each subject should begin on a new page to facilitate distribution to the appropriate staff at each Centre for action. The memo number should appear on each page.
- Items which require the agreement of the cooperating Centres should be noted on the appropriate page.
- All proposed changes and additions to the dictionaries, CINDA Manual, EXFOR Formats Manual, and LEXFOR should contain (where possible) a revised ENTRY in the format of the appropriate document, in addition to the usual documentation.

- In case of disagreement, the originating Centre is responsible for collecting the points of consensus and issuing a final wording in the format of the appropriate document(s).

- In e-mails with memos attached, the subject should be put in the body of the e-mail in order that recipients can decide on its relevance. Only one memo should be sent per e-mail.

- Centres are responsible for keeping the distribution list of Memos up-to-date.

MANUALS

The Centre responsible for the updating of all Manuals is NDS.

The final proposed Manual update submitted in a Memo or in the minutes of an NRDC meeting, is entered into the Manuals substantially unchanged. However, the responsible Centre is free to introduce editorial changes to maintain a consistency of style. The responsible Centre is also responsible for maintaining the internal consistency of the Manuals, which means, *e.g.*, that they must check whether an agreed proposal entails changes (cross-references, *etc*.) in other parts of the Manuals.

In general, a non-editorial change on a Manual page, as compared to its previous version, is marked by a vertical line in the left-hand margin, and the date of the latest revision to that page is given at the bottom of each page.

Where there are different views on matters of minor importance, these may all be included in LEXFOR in so far as these views are in agreement with the agreed procedures and do not cause ambiguities in the definitions of codes.

Manual updates will be issued regularly.

EXFOR PROCESSING AND RETRIEVAL CODES

Some EXFOR Processing and Retrieval programs are used by more than one data Centre. Each Centre using one of these programs is invited to contribute suggestions for updates to the program. The originating Centre will coordinate all program updates.

If another Centre wishes to update a code, that Centre should communicate their intention to the originating Centre before any updates are done. Any updates can be done after discussion with the originating Centre and upon mutual agreement. The updated code should be transmitted immediately to the originating Centre.

The originating Centre retains responsibility for the official version of the code and is free to reject unsanctioned updates. Only the originating Centre will transmit updated versions to the other Centres.

Appendix A: Compilation Scope

General categories

Category	Data type
A - Compulsory compilation	All experimental data for incident projectile energy ≤ 1 GeV and projectiles with A ≤ 12, unless listed in Cat. B; and data measured in inverse kinematics, which fulfil these criteria when target and projectile are exchanged.
B - Voluntary compilation	Neutron- or charged-particle data with E_{in} > 1GeV; Heavy ion data for projectiles with A>12; Photonuclear data except photoneutron and photofission data; Vector and tensor polarization data; Kerma factors (integral data only)
C - Separate transmission	Other data types, as specified in the table below

Separate Transmission Series

CIC *)	Centre	Data types
J	JCPRG	Charged-particle nuclear data for projectiles with non-positive baryon number from all parts of the world.
V (extinct)	NDS	Evaluated neutron data

*) Centre Identification Character

Appendix B: Compilation Responsibilities

Centre	Basic responsibility	Additional compilation
NNDC	Neutron data, CPND and PhND from USA and Canada	
NEA-DB	Neutron data from NEA Data Bank member countries	CPND (coordinated by NDS)
NDS	Neutron data and CPND from "rest of the world" (areas not covered otherwise)	PhND from "rest of the world"
CJD	Neutron data from former Soviet Union (except Ukraine)	
CaJaD	CPND from former Soviet Union (except Ukraine)	CPND from "rest of the world" (coordinated by NDS)
CDFE	Photonuclear data	
CNDC	Neutron data and CPND from China (entries submitted through NDS)	
JCPRG	CPND and PhND from Japan	CPND for projectiles with non-positive baryon number from all parts of the world.
JAEA	(Dissemination of Japanese Evaluated Data Libraries)	
ATOMKI	CPND from ATOMKI and data measured in cooperation with Jülich or with Free Univ. Brussels (entries submitted through NDS)	
UkrNDC	Neutron data, CPND and PhND from Ukraine (entries submitted through NDS)	
CNPD	CPND on light nuclei, coordinated with other Centres	
Indian compilation activity *	Neutron data and CPND from India, coordinated and assisted by NDS	
KAERI	Neutron, CPND and PhND data from Korea (entries submitted through NDS)	

* coordinated by Dr. S. Ganesan, B.A.R.C., Mumbai, India