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Kuri, Ramesh and Singh, Madan, "Indian Institutional Repositories (IRs) reflected in the Directory of Open Access Repository (DOAR): A Case Study" (2020). *Library Philosophy and Practice (e-journal)*. 4640. <https://digitalcommons.unl.edu/libphilprac/4640>

Indian Institutional Repositories (IRs) reflected in the Directory of Open Access Repository (DOAR): A Case Study

Ramesh Kuri^a Madan Singh^b

Abstract

Open access resources are an essential part of the academic community by which students, researchers, and even faculties get useful resources to pursue their academic requirements. Open access repositories enhance the visibility of scholarly publications and improve the collaboration among the authors with the support of global networks. Open access institutional repository provides a platform to showcase the intellectual works of an individual organisation. At present a total of 5414 repositories were found on DOAR from all countries on different subjects. Out of 5414, 96 repositories were from India. The analysis presented in this study is based on selected criteria like software used, size of items, content included, languages and policy used, etc. This study explores the prominence of open access institutional repositories of India reflected in the Directory of Open Access Institutional Repository (DOAR). Authors made to visualize India's contribution to repository type, disciplines, languages covered, and software used for building the Institutional Repository (IR) to communicate it better. As a concluding remark, the authors elucidated the opportunities and threats associated with the development of OAIR to meet the educational requirements of the academic community.

Keywords: *Open Access, Scholarly communication, Institutional Repositories, DOAR, Dspace*

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1. Introduction

The philosophy behind the concept of 'open' is to share the resources for free, duplication prevention, and easy access to the stakeholders. Further, it avoids restrictive policies like copyright to material along with the promotion of economic efficiencies. Open access commonly understood that sharing content, usually of scholarly nature, without a requirement for the use of an open license. With the advent of computer technology and the internet during the beginning of the 1980s, the concept of free movement emerged to facilitate access to different kinds of materials, information, and technological codes for free. Open education movement, open-source movement, open learning, open access movement, and open data movement result from such open movements that emerged during the years to freely share the scholarly materials, software, and online access to scholarly communications open access institutional repositories.

A repository is a place where something is stored in significant quantities. Repositories developed as part of the knowledge management by an institution becomes the cause for an institutional repository. According to Lynch (2003), an institutional repository is a "set of services that a university offers to its community members for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution."

The development of the open access movement has started relatively late in India but became popular quickly throughout the country. Our country has been one of the most prominent partners in the field of the open knowledge movement. The first repository started working in 2004 at the Indian Institute of Science, Bangalore. Today the open Access movement in India is acknowledged worldwide. India is playing a pivotal role in the open access repository movement. India is the most prominent member country with DOAR in terms of developing institutional repositories. Many workshops and training events are being organized, and professionals are being provided with training in open source software for building open access repositories (Roy, 2016).

Open DOAR (The Directory of Open Access Repositories) is a global Directory of Open Access Repositories developed and maintained by the University of Nottingham (UK) in association with the University of Lund (Sweden). It is a free access repositories directory project to promote open access repositories and was launched in 2005. Open DOAR facilitates searching, finding, and retrieving country-based lists of repositories, and it also acts as a tool for repository administrators to get the statistics. Being a quality-assured global directory, Open DOAR provides an opportunity for all the countries to get into the registry of their institutional repositories. Each of the repository records has been carefully reviewed by a panel of experts of its editorial team, hosts all the registered institutional repositories, and provides free, open access to the academic community.

2. Literature Review

To understand the realistic picture, research development, and to know the scope of open access, institutional repositories authors have reviewed a few of the following studies. Adewole et.al (2020) analyzed open access institutional repositories growth in Nigeria through the OpenDoar directory of all open access institutional repositories (OAIR's) in the world. The authors used different search parameters such as Type, Status, software, total number of records, subject covered and content uploaded. From the past ten (2009-2019) years, the Nigeria country has registered a total of 25 OAIR's in OpenDoar and from which a total 68,610 of items were uploaded. The study identified the Nsukka is one of the OAIR's in Nigeria which has the highest i.e. 23,367 items. The study also revealed that most of the institutional repositories are multidisciplinary. Further most of the OAIR's in Nigeria preferred Dspace for the creation of their institutional repository. Based upon the study analysis and findings, the authors recommended that the IR's should be made a prerequisite for Nigerian Universities Commission (NUC) accreditation. To set up functional IR's proper funding should be made available from time to time. Singh (2017) examined the open-access IRs in Australia by selecting the database of Directory of Open Access Repositories. The study observed that most 76.36% of the IRs belong to Universities, whereas 23.64% are from research institutions. It revealed that the English language is found most preferred (98.18%) language interface by Australian IRs. Finally, the study results showed that DSpace was the most widely used (27.27%) software among Australian repositories. Das & Singh (2017) conducted a case study to derive the current status of Chinese Open Access Institutional Repositories. The authors have attempted to understand the current status of open access institutional repositories in China based on the four key indicators, i.e., the number of IRs, types, subjects, contents, and software used. To fulfill the specified objectives, the Open access institutional repositories in China were identified by selecting the database of Directory of Open Access Repositories (Open DOAR), and the data were collected and analyzed for the necessary information. The study highlights the current status of open access institutional repositories in China and its contribution to a global knowledge base. Singh & Verma (2017) conducted a study to discover the current status of open access institutional repositories of Asian countries. It determines individual country and number of records archived, subjects and core contents, language interface for sharing of information, various software used to create open access IRs and their operational issues. Vyas (2013) conducted a study on Indian Institutional Repositories registered in DOAR. A total of 2233 repositories were found in DOAR, out of them, 54 repositories were from India. The growth of IIR on DOAR was observed during the years of 2005 to 2012 and the majority of IR's were functioning on Dspace and Eprints repository softwares. Further the doctoral theses and conference contents were found major information sources on IIR and English is the most common language used in items of IIR.

Directory of Open Access Repository (Open DOAR) was explored for observing Global visibility of Asian Countries 'Open Access IRs. Findings indicate that 51.71% were created in Eastern Asia alone. The study also found that China has contributed the highest number, i.e., 5027585 (41.31%) of records in open access IRs among other Asian countries. Vyas (2013) conducted a study on Indian Institutional Repositories registered in DOAR. A total of 2233 repositories were found in DOAR. Out of them, 54 repositories were from India. The growth of IIR on DOAR was observed during the years 2005 to 2012, and the majority of IR's were functioning on Dspace and Eprints repository software. Further, the doctoral theses and conference contents were found primary information sources on IIR, and English is the most common language used in items of IRs.

3. Scope and Limitations of the study

This study is focused on web-based institutional repositories designed and registered in quality-assured, global Directory of Open Access Repositories (DOAR). To know the research contributions of developing countries, the researcher limited this study only to India's institutional repositories.

4. Objectives:

- 1) To know the year-wise distribution of Indian institutional repositories;
- 2) To assess the repositories type, subject and languages wise distributed in DOAR;
- 3) To know the type of Digital library and software used for Institutional Repositories;
- 4) To analyse India's Institutional Repositories enrollment in DOAR,

5. Methodology

The authors have collected data from the Directory of Open Access Repositories (DOAR) using the website <https://v2.sherpa.ac.uk/opensdoar> and accessed it on 10 Oct 2020. The collected data were categorized into year-wise, type of repositories and software used language content, and subject-wise repositories and country-wise registration of Institutional repositories in DOAR. Further, the collected data were tabulated using MS. Excel and data given were analyzed and interpreted in the form of tables and graphs.

6. Result and Discussion

As the main objective of this study is to measure the contributions of Indians to the Open Access Institutional Repositories portal, authors have used the Directory of Open Access Repository portal as a tool to segregate the required data and to visualize the same. The collected data from the DOAR website has been analyzed and interpreted with charts under the following sub-headings.

6.1 Year-wise Growth Pattern:

Year	IRs	%	Year	IRs	%
2005	3	3.13	2014	2	2.08
2006	10	10.42	2015	9	9.38
2007	7	7.29	2016	5	5.21
2008	5	5.21	2017	3	3.13
2009	4	4.17	2018	0	0.00
2010	6	6.25	2019	11	11.46
2011	11	11.46	2020	5	5.21
2012	2	2.08	Total	96	100.00
2013	13	13.54			

Table 1: The year-wise Growth pattern of Institutional Repository

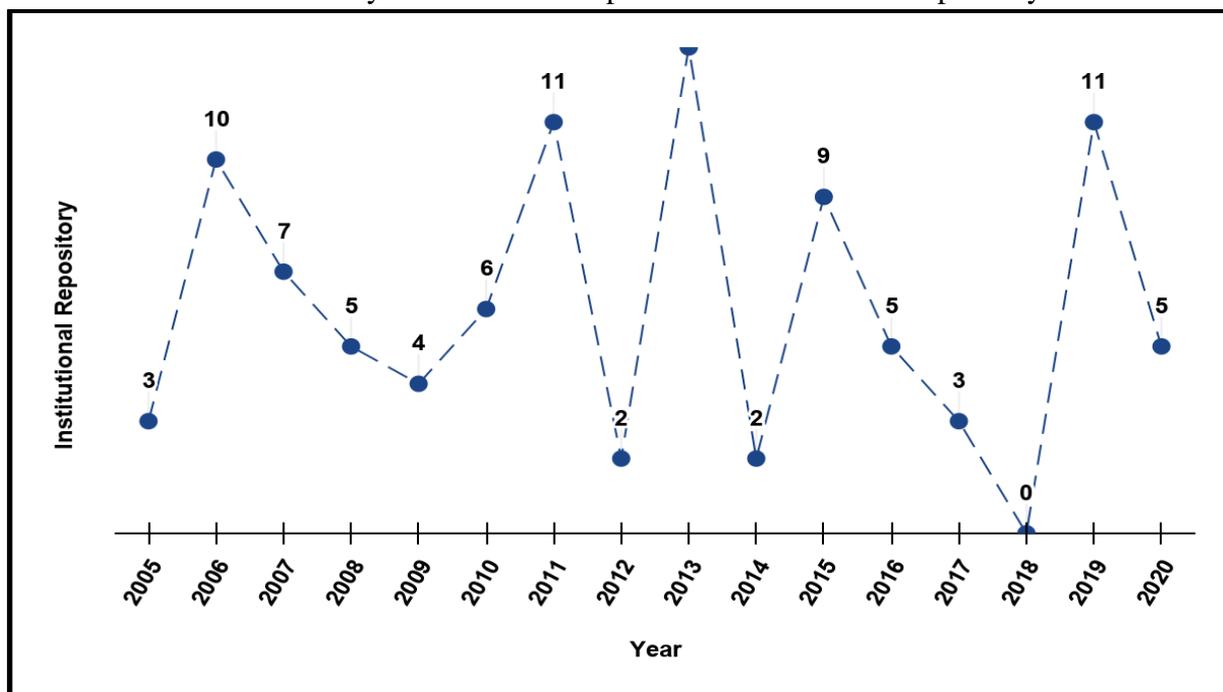


Figure1: Year-wise Growth pattern of Institutional Repository

Table: 1/ Fig 1 depicts the year-wise growth registration of institutional repositories in the DOAR with its cumulative percentage. It is represented that out of 96 institutional repositories highest, i.e., 13 (13.54%) institutional repositories were registered in the years of 2013, followed by 11 (11.46%) repositories in 2011 & 2019, 10 (10.42%) repositories in 2005, and no repositories registered in 2018. It is evident from the analysis that non-constant growth is

found in the registration of Institutional repositories with DOAR, which shows that in this year, there were not any Institutional Repositories established.

6.2 Nature of Institutional Repository

Types of IRs	Number	%	Records
Governmental	1	1.04	0
Aggregating	5	5.21	328500
Disciplinary	9	9.38	23402
Institutional	81	84.38	555209
Total	96	100.00	907111

Table 2: Types of Institutional Repository

Institutional repositories (IRs) are categories under four significant heads: Governmental, Aggregating, Disciplinary, and Institutional. Table: 2. shows the maximum number of repositories are Institutional (81) followed by Disciplinary (9) and Aggregating (5) repositories, respectively, while the least amount of repository is Governmental (1). It is observed from the analysis that academic institutions' institutional repositories were found more in number than other types of IR's.

6.3 Software Usage of Repositories

Software	Number	%
Dspace	54	56.25
EPrints	32	33.33
Undefined	3	3.13
Architexturez	1	1.04
CSIR Central	1	1.04
Drupal	1	1.04
Greenstone	1	1.04
Metastudio	1	1.04
Nitya	1	1.04
OPS	1	1.04

Table 3: Software-wise distribution of IRs

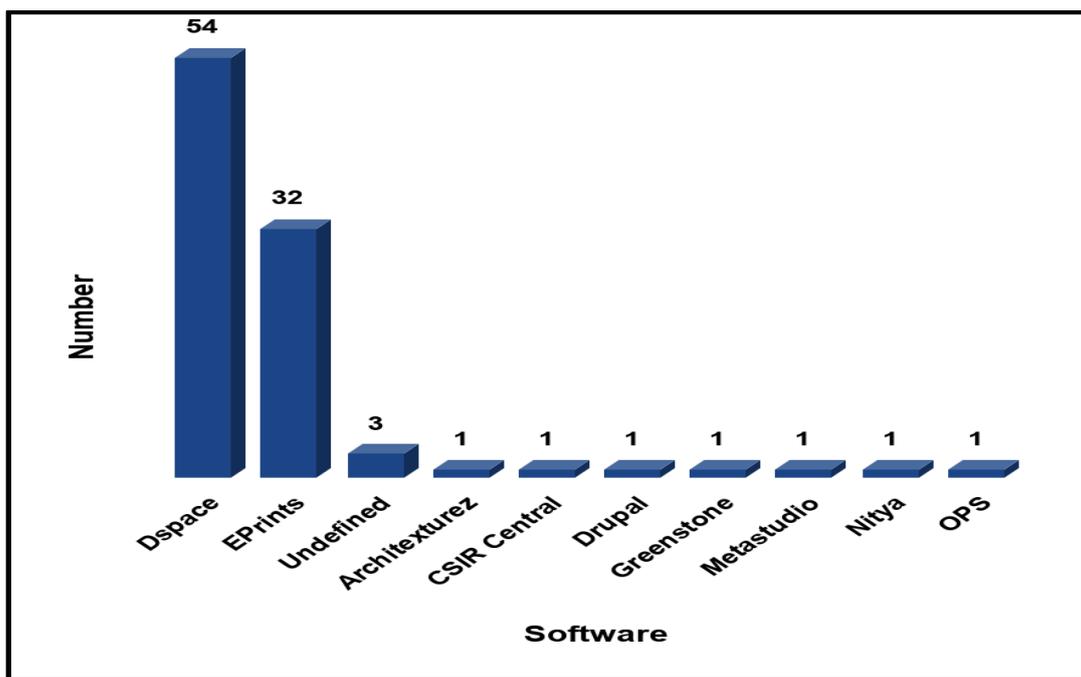


Figure: 2 Software-wise distribution of IRs

Table: 3/fig2 shows the distribution of the software used for the deployment of Institutional repositories in India. The most widely used software is the open-source application DSpace 54(56.25%), followed by Eprints with 32(33.33%), Undefined with 3(3.13%), and the least number of repositories use Architexturez, CSIR Central, Drupal, Greenstone, Metastudio, Nitya and OPS with each 1(1.04%). It is evident that more than 55% of IRs registered with DOAR were using open source software

6.4 Language-wise Distribution of IR

Language	Number	%
English	95	79.17
Hindi	10	8.33
Marathi	3	2.50
Gujarati	3	2.50
Arabic	2	1.67
Malayalam	2	1.67
Kannada	2	1.67
Persian	1	0.83

Sanskrit	1	0.83
Bengali	1	0.83
Total	120	100.00

Table 4: Language-wise distributions

Languages allow humankind to access information and data contents, to draw inferences to set and accomplish goals. India reflects a multi-language where the Indian Government uses English for some communication as a supplement to Hindi. It is observed from the table: 4 that a large number of repositories use more than one language as an interface. Ninety-five repositories have used English, followed by Hindi with 10(8.33%), followed by Marathi and Gujarati have same with 3(2.50%), Arabic, Malayalam, Kannada has same with 2(1.67%), and Persian, Sanskrit, and Bengali have the same 1(0.83%) repositories. The data reveals that though India has a multi-language country, whereas the majority of IR's were developed in internationally accepted language, i.e., English.

6.5 Core Content Types

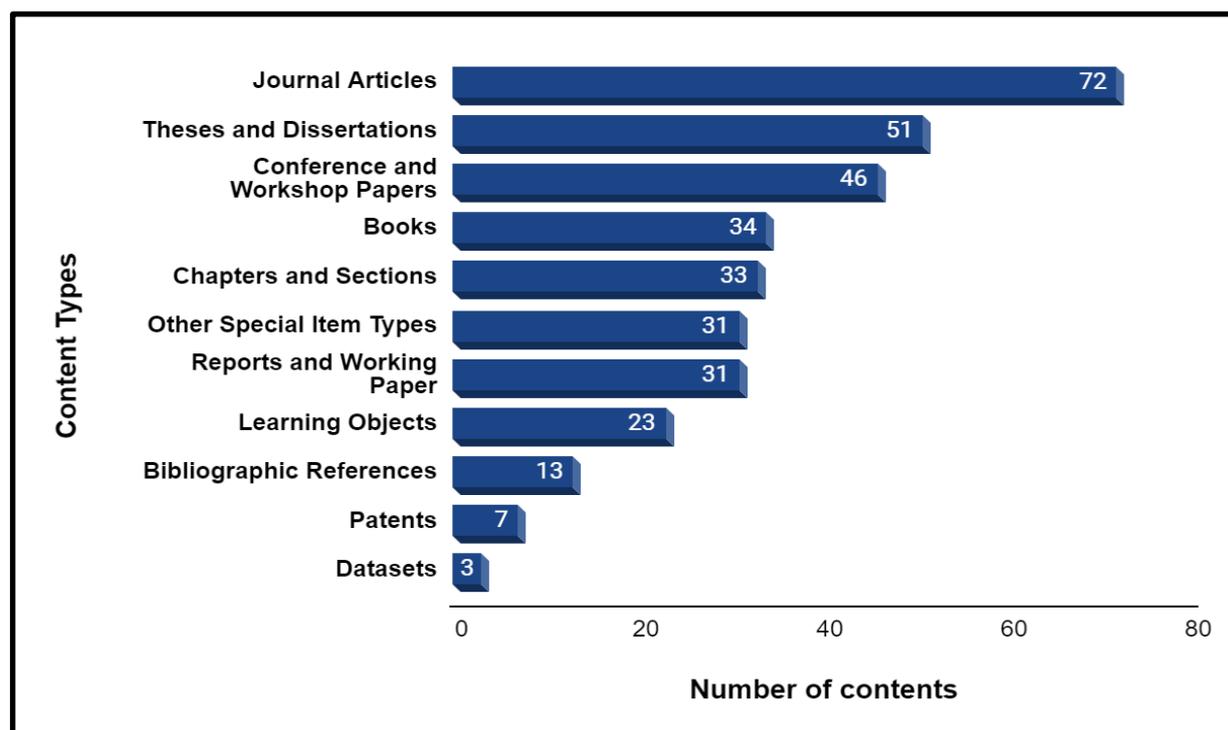


Figure: 3 Content Types v/s Number of Contents

Figure: 3 shows the range of sources content types of institutional repositories registered by India with DOAR. The nature of contents being added to the repository distributions is recorded under its numbers with a cumulative percentage. The leading types of contents found in the repositories of open DOAR journal articles 72(20.93%) followed by theses & dissertations 51(14.83%) and conference & workshop papers 46(13.37%), Books 34(9.88%),

Chapters and Sections 33(9.59%), Other Special Item Types and Reports and Working Paper 31(9.01%), Learning Objects 23(6.69%), Bibliographic References 13(3.78%), Patents 7(2.03%), Datasets constitute a minimal amount of content with 3(0.87%). From the analysis, most of the authors were more curious and involved in contributing journal articles than any other content, as indicated in the table.

6.6 Discipline wise Distribution of IR

Subjects	No.	%	Subjects	No.	%
Agriculture	7	2.45	Language and Literature	1	0.35
Architecture	1	0.35	Law and Politics	1	0.35
Arts and Humanities General	3	1.05	Library and Information Science	6	2.10
Biology and Biochemistry	9	3.15	Management and Planning	3	1.05
Business and Economics	2	0.70	Mathematics and Statistics	4	1.40
Chemistry & Chemical Technology	12	4.20	Mechanical Engineering & Materials	10	3.50
Civil Engineering	5	1.75	Multidisciplinary	46	16.08
Computers and IT	9	3.15	Physics and Astronomy	8	2.80
Earth and Planetary Sciences	4	1.40	Psychology	2	0.70
Ecology and Environment	6	2.10	Science General	58	20.28
Education	1	0.35	Social Sciences General	18	6.29
Electrical & Electronic Engineering	7	2.45	Technology General	44	15.38
Food and Veterinary	7	2.45	Total	286	100.00
Health and Medicine	12	4.20			

Table: 6 Subject-wise distributions

Table: 6 depicts the discipline-wise distribution of institutional repositories in DOAR. The majority., i.e., 58(20.28%) of Institutional Repositories consist of Science in General, followed by 46(16.08%) multidisciplinary, 44 (15.38%) technology in General, 18(6.29%) Social Science, 12 (4.20%) each Health & Medicine and chemistry & Chemical Technology, 10(3.50%) Mechanical Engineering & Materials, Further, a very few IR's consist of other subjects, as shown in the above Table.

6.7 Ten oldest Institutional Repositories with the date of establishing year

Repositories Name	Date
Open Access Repository of IISc Research Publications (ePrints@IISc)	21-Dec-2005
Librarians' Digital Library (LDL)	22-Dec-2005
OpenMED@NIC	28-Dec-2005
DSpace at Indian Institute of Management Kozhikode (DSpace@IIMK)	04-Jan-2006
Dspace@NITR	04-Jan-2006
Electronic Theses and Dissertations at Indian Institute of Science (edt@IISc)	04-Jan-2006
OneWorld South Asia Open Archive Initiative	11-Aug-2006
Indian Institute of Astrophysics Repository (DSpace@IIA)	14-Aug-2006
Indian Institute of Management Kozhikode Scholarship Repository (ePrints@IIMK)	14-Aug-2006
National Aerospace Laboratories Institutional Repository (CSIR-NAL)	16-Aug-2006

Table: 7 Ten oldest Institutional Repositories

Table:7 reveals the top 10 oldest institutional repositories registered with the Directory of Open Access Institutional Repositories. It is observed that the Open Access Repository of IISc Research Publications (ePrints@IISc) is found in the oldest institutional repository, which is registered with DOAR on 21 Dec 2005. followed by Librarians' Digital Library (LDL) 22-Dec 2005 and OpenMED@NIC on 28 Dec 2005. It is apparent that among the top ten oldest institutional repositories majority, i.e., seven institutional repositories, have registered from 04 Jan 2006 to 16-Aug-2006.

7. Major findings

1. It was found from the analyst highest, i.e., 13.54% institutional repositories were registered in 2013. Furthermore, none of the Institutional repositories enrolled with DOAR in 2018.
2. The analysis found that maximum, i.e., 84.38% number of repositories is Institutional.
3. It was evident from the study that Dspace 56.25% is found most widely used open-source software.

4. It was found from the study that a massive, i.e., 79.17% of repository contents are in the English language.
5. The analysis found that the journal articles, i.e., 20.93%, are the leading type of contents found in the DOAR.
6. The observed data shows that the highest, i.e., 20.28% of Institutional Repositories, consists of Science in General contents.
7. It was found that the "Open Access Repository of IISc Research Publications (ePrints@IISc)" is the oldest and earliest (21-Dec-2005) institutional repository, which was indexed in DOAR.

8. Conclusion

India has been at the forefront of the open access movement since 2003, with more than seventy nation-wide repositories built to date. Many institutions have developed an institutional policy to facilitate innovative solutions for increasing international visibility and accessibility of scholarly literature and documentary heritage in this country. Many library schools have included open-source digital archiving software in their curricula. Moreover, almost all Indian IRs are based on open standards and open-source software like DSpace, EPrints, Greenstone, etc. The analysis evident from the study that there is a need to raise awareness within the community about the institutional repository and encourage the broader contribution of content to the DOAR. India has a long way to go, and it is hoped that in days to come, researchers would strengthen the country's open access movement. Further, the Government also should come forward to pass the legislation so that every educational and R&D institution should adopt it and make it mandatory for every author from their institute to self-archive the articles accepted for publication in their Institutional Repository.

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