



## Application of Web 2.0 tools in CSIR laboratories and Institutes

Shagufta Parween Siddiqi

Research Scholar

Department of Library and Information Science,

Aligarh Muslim University, Aligarh, U.P

Email: parween.alig@gmail.com

M. Masoom Raza

Associate Professor

Department of Library and Information Science,

Aligarh Muslim University, Aligarh, U.P

Email: masoomr@yahoo.com

### Abstract

The Council of Scientific & Industrial Research (CSIR) is a contemporary R&D organization, known for its cutting edge R&D knowledgebase in diverse S&T work. Due to fast and emerging development of information technology, CSIR is not remain untouched with the advent of Web 2.0 technology. A typical technology is Web 2.0 which has recently emerged as a second generation of web-based technologies for communication. Web 2.0 has been strongly applied in the field of e-commerce, online advertising and other online services. The main purpose of this study is to provide overall picture of the applications of Web 2.0 technologies in CSIR institutes and laboratories. The main focus of the paper isto know, what types of Web 2.0 technologies are applied in CSIR institutes and laboratories. Content analysis was used in terms of quantitative approach. For gathering of data a checklist as the main research instrument was developed, based on other checklists and questionnaires, and synthesized ideas from literature. Data was collected by accessing all CSIR institutes and laboratories websites. Microsoft Excel was used, as a main tool to synthesize and analyze data.

*Keywords:* Web 2.0, CSIR, Blogs, Wikis, Podcasts, RSS

### 1. Introduction

The term Web2.0 refers to the development of online services that encourage collaboration, communication and information sharing. It represents a shift from the passive experience of static “read only” web pages to the participatory experience of dynamic and interactive web pages. In other words, Web2.0 reflects changes in how we use the web rather than describing any technical or structural change. In the present era of information technology, libraries are changing faster than ever before. These changes offer great opportunities for progressive libraries to reach far beyond the boundaries of their traditional librarianship. Library web sites are changing in their content and structure, with the introduction of social networking sites



(SNS) in recent years and the ever-increasing usage among teenagers. Web 2.0, the second phase in the Web’s evolution, is attracting the attention of IT professionals, businesses, and Web users. Web 2.0 is also called the wisdom Web; people centric Web, participative Web, and read/write Web. Web 2.0 harnesses the Web in a more interactive and collaborative manner, emphasizing peers’ social interaction and collective intelligence, and presents new opportunities for leveraging the Web and engaging its users more effectively. Within the last two to three years, Web 2.0, ignited by successful Web 2.0 based social applications such as MySpace, Flickr, and YouTube, has been forging new applications that were previously unimaginable.

**2. Concept and characteristics**

Tim Berners Lee in his book weaving the web describes how he developed the web and also how he was creating a way to share information. When the Web 1.0 started in the 90s it was much more complicated and difficult to write than read this information. Writing required the skill to use HTML and also the use of a web server, which were not common at the time. Most people used the web to receive information, but only a small number were creating it. Web 2.0 websites enable users to do more than just retrieve information. While the term is widely defined and interpreted, “Web 2.0” was reportedly first conceptualized and made popular by Tim O’Reilly and Dale Dougherty of O’Reilly Media in 2004 to describe the trends and business models that survived the technology sector market crash of the 1990s( O’Reilly, 2005). The term is now widely used and interpreted, but Web 2.0, essentially, is not a web of textual publication, but a web of multi-sensory communication. It is a matrix of dialogues, not a collection of monologues. It is a user centered Web in ways it has not been thus far.

This characterization of the current state of the Web is at times contended, and though the clear delineation between the first and second Webs is here admitted to be rather arbitrary, it still must be recognized that the Web is indeed evolving into a more interactive, multi-media driven technological space. As O’Reilly observes in what is often cited as the seminal work on Web 2.0, personal web-pages are evolving into blogs, encyclopedias into Wikipedia, text-based tutorials into streaming media applications, taxonomies into “folksonomies,” and question-answer/email customer support infrastructures into instant messaging (IM) services.

**3. Tools of Web 2.0**

The various tools of Web 2.0 such as blogs, wikis, SNSs, RSS, tagging, instant messaging, podcasts and video casts are popular and widely used by the user community. These tools provide much better and simple features, which are very flexible in both configuration and functionality. These tools of Web 2.0 are listed in Table 1 below:

Table 1  
Web 2.0 tools and definitions

Tools	Definition
<b>Real simple syndication (RSS)</b>	RSS is lightweight XML format which is used for publishing frequently updated content such as blog entries, news headlines, and podcasts in a standardized format



<b>Blog</b>	Blog is a web site, usually maintained by an individual, with regular entries of commentary, descriptions of events, or other material
<b>Wiki</b>	Wiki is a collaborative web site which can be directly edited by anyone with access to it (Wikipedia.org)
<b>Podcast</b>	Podcasts are audio content available on the internet that can be automatically delivered to a personal computer or MP3 player simply put, podcasts are audio on the Web ( Geoghegan and Klass, 2005).
<b>Vidcast</b>	A video clip designed to be viewed in a portable device. Also called a "vcast," "vodcast" and "videocast," a vidcast is the video counterpart of a podcast and uses the same RSS syndication method for delivering material to users
<b>Instant messaging (IM)</b>	IM is a live online communication synchronous channel which facilitates online interaction between two parties
<b>Social bookmarking/tagging</b>	Social bookmarking is a method for internet users to store, organize, search, and manage bookmarks of web pages on the internet with the help of user-driven metadata (uncontrolled vocabularies). Usually known as tagging/label
<b>Social networking sites (SNS)</b>	Social network sites are web-based services that allow individuals to(1) construct a public or semi-public profile within a bounded system,(2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system (Boyd & Ellison, 2007)

#### 4. Literature review

A number of studies have been conducted to know the web 2.0 applications in different type of institutions/organizations and web 2.0 technologies. O'Reilly (2005) popularized the term Web 2.0 by his much cited article "What is Web 2.0?" A lot of articles have been written on Web 2.0. When author was writing this article he searched on "Web 2.0" in general title on Google Scholar, retrieved 3,830,000 articles and it is increasing day by day. Ajjan & Hartshorne (2008) studied the faculty's awareness of the benefits of Web 2.0 to supplement in-class learning and better understand the faculty's decisions to embrace these tools using the decomposed theory of planned behavior (DTPB) model. Survey was conducted for the collection of data in the southeastern United States. There were 136 participants, including male and female. They establish that some Web 2.0 technologies could improve students' learning, their interaction with faculty and with other peers, their writing abilities, and their gratification with the course; few choose to use them in the school room. Chen Xu, Ouyang, & Chu (2009) conducted study to examine the application and implication of web 2.0 in academic library in the New York State. Data were collected from the websites of the 81 academic libraries of the New York State. Results reveal that 42% of them adopted one or more Web 2.0 tools such as blogs while implementation of those tools in individual libraries varies greatly. A model of conceptual Academic Library 2.0 is also proposed by Chua & Goh (2010) discussed about Web 2.0 applications in library websites. The study suggests that the order of popularity of Web 2.0 applications implemented in libraries is blogs, RSS, instant messaging, social networking



services, wikis, and social tagging applications. Harinarayana & Raju (2010) discussed Web 2.0 features in university library web sites. 37 university libraries use RSS feeds for public exposure of library news, cases and announcements and 15 university libraries provide blog space for users. Whereas wiki is the least applied Web 2.0 technologies, with only one university using it, Instant Messaging is another most widely applied feature with 37 libraries already providing reference help through it. Podcast (used in three libraries) and Vidcast (used in six libraries) are yet to become popular facilities to be offered on university library web sites. Li Si, Shi, & Chen (2011) analysed the application of Web 2.0 in Chinese university libraries. Two-thirds of Chinese university libraries deployed one or more Web 2.0 technologies. Only one-tenth of libraries adopted more than four Web 2.0 technologies. RSS was the most widely applied, while Wiki was the least. The application of Web 2.0 technologies among Chinese university libraries was not extensive and profound enough. Mahmood & V. Richardson Jr, (2011) conducted study on adoption of Web 2.0 in US academic libraries: a survey of ARL library websites. All libraries were found to be using various tools of Web 2.0. Blogs, microblogs, RSS, instant messaging, social networking sites, mashups, podcasts, and vodcasts were widely adopted, while wikis, photo sharing, presentation sharing, virtual worlds, customized webpage and vertical search engines were used less. Arif & Mahmood (2012) have discussed the shifting function of librarians in the digital world adoption of Web 2.0 technologies by Pakistani librarians. Survey method was used for the collection of data. Study showed that instant messaging, blogs, social networking and wikis were the most popular Web 2.0 technologies. The major hindrances of Web 2.0 adoption for librarians were lack of computer literacy and lower availability of computers and internet facilities. Awareness and training programs could enable librarians to cope with Web 2.0 technologies. Mahmood & Richardson Jr (2013) have examined the impact of Web 2.0 technologies on academic libraries by survey of ARL libraries. It was found that each library was using some form of technology, such as RSS, blogs, social networking sites, wikis and instant messaging. Kebede (2014) studied on adoption of Web 2.0 in academic libraries of top African universities. About half of the libraries in the study adopted one or more Web 2.0 applications. Social networks were the most widely adopted while social bookmarking and tagging were the least used applications. Hussain (2015) conducted study to discuss the adoption of Web 2.0 in library associations in the presence of social media. This paper focused on penetration of Web 2.0 tools in various library associations all over the world. The study was conducted through an assessment of the library associations' web sites. A total of 188 library associations' web sites were analysed, out of which 115 library associations have implemented Web 2.0 applications; this is 61.17 percent of the total. On the basis of the analysis it was found that the majority of Web 2.0 tools have been used by American continents library associations. This stands at, 89.86 percent, whereas only a small number of Web 2.0 tools have been used by Asian continent library associations, that is, 25.64 percent. The most of Web 2.0 tools used by library associations, is, Facebook, Twitter, RSS feeds, LinkedIn, Flickr and Blogs. Al-Kharousi et al., (2016) have studied the different factors affecting the implementation of Web 2.0 applications in Omani academic libraries. The study indicated that there are nine internal factors and four external factors that affect using Web 2.0 applications in OALs. These are: lack of training, constant changes in the management structure, lack of policy and regulations and weakness and low speed of the internet.

## 5. Research Questions



The present article addresses the following two research questions:

- (1) What types of Web 2.0 technologies have been applied in CSIR websites?
- (2) Upto what extent are these Web 2.0 technologies being used by CSIR Laboratories?

## **6. Research Design**

### **6.1 Research Method**

This study is based on content analysis that is used for the quantitative approach. In the past, “content analysis is used to identify and record the meaning of documents and other forms of communication in a systematic and quantitative way” (Allen and Reser, 1990). This method has been used for the study of modern technologies such as radio, television, internet and web sites (Salinas, 2006). Web 2.0 is a set of different technologies, there is no standard criteria to evaluate Web 2.0 applications in the library that’s why the researcher had developed his own research instrument. A checklist was used as research instrument to collect data, and was developed from adopted and various checklists, questionnaires, and synthesized ideas from literature. The checklist was based primarily on the usability evaluation of library web sites (Keevil, 1998).

### **6.2 Research Sample**

As a result, a subset of the whole research population was collected and made up a list of 43 CSIR laboratories (38 national laboratories and 5 units- see Annex-I).

According to Ministry of Science and Technology, Govt. of India, the Council of Scientific & Industrial Research (CSIR) is a contemporary R&D organization, known for its cutting edge R&D knowledgebase in diverse S&T areas. CSIR has a dynamic network of 38 national laboratories, 39 outreach centres, 3 Innovation Complexes and 5 units. CSIR’s R&D expertise and experience is embodied in about 4600 active scientists supported by about 8000 scientific and technical personnel. Author collected as large a sample as possible by the following methods:

- Created a list of 43 CSIR laboratories of India (provided by Ministry of Science and Technology, Govt. of India from website [www.csir.res.in/csir](http://www.csir.res.in/csir)).
- Accessed all web sites of CSIR laboratories in the list to identify the existence of Web 2.0 technologies.
- Marked the laboratory on the list that used any types of Web 2.0 technologies.
- As a result, a subset of the whole research population was collected and made up a list of 43 CSIR laboratories (38 national laboratories and 5 units-see Table 2).

### **6.3 Data collection**

The data were collected twice. The first time finished in October 2016. The second time was during the first week of January 2017. The process of collecting data was same in both the times. The second time process was repeated for the rechecking and accuracy of data, collected from the website of CSIR laboratories. Following steps have been implemented for the collection of data:



- The data has been gathered by accessing, all selected laboratories, by looking at links such as Follow us, Video gallery, Photos gallery, organisation in media, icon of Social Networks and Communication etc. to see the availability of SNS (Facebook, Twitter, LinkedIn, MySpace, G+) RSS, Blogs, IM, Podcasts, Vidcasts etc. These links are on home pages or second level of sub pages of the laboratories web sites.
- Used search function of web sites to check the availability of web 2.0 tools. Almost web sites of selected CSIR laboratories provided search boxes that allows users to search for words or phrases such as RSS, Blog, Chat and Tag etc. This step is useful as it enables the researcher to identify the availability of Web 2.0 in the laboratories' web sites even if the links to those applications are not in the home pages or the second-level sub-pages of the web sites.
- Used "Google search" for laboratories that did not provide a search box on their web sites.
- Used "Google search" to search for the laboratories' blogs that hosted by free domain names instead of the laboratories' domain names.

## 7. Data Analysis and Discussion

Checklist was used for the collection of data and used statistical techniques to analyze data. The checklist was converted in to Microsoft Excel spreadsheets. Each checkpoint in the checklist was assigned a value either 1 or 0 (yes or no answers). These values were input directly in a spreadsheet and then the "SUM" function of Excel was used to calculate the data. Following table shows the details:

Table 2  
Usage of Web 2.0 tools in CSIR laboratories (Part 1)

Sl No.	Name	Blogs	RSS	IM	SNS	Vidcasts	Total Web 2.0 tools
1	CFTRI, Mysore	1	1	0	1	0	3
2	CMERI, Durgapur	0	1	0	1	1	3
3	CRRI, New Delhi	0	1	0	1	1	3
4	IHBT, Palampur	0	1	0	1	1	3
5	NEERI, Nagpur	0	1	0	1	1	3
6	OSDD, New Delhi	1	0	1	1	0	3
7	AMPRI, Bhopal	0	1	0	1	0	2
8	CCMB, Hyderabad	0	0	0	1	1	2
9	CIMFR, Dhanbad	0	1	0	1	0	2



10	CSIO, Chandigarh	0	1	0	1	0	2
11	CSMCRI, Bhavnagar	0	1	0	0	1	2
12	IICB, Kolkata	0	1	0	1	0	2
13	IIP, Dehradun	0	0	0	1	1	2
14	IMT, Chandigarh	0	0	0	1	1	2
15	NCL, Pune	0	1	0	1	0	2
16	NIO, Goa	0	1	0	1	0	2
17	CBRI, Roorkee	0	0	0	1	0	1
18	CDRI, Lucknow	0	0	0	1	0	1
19	CERI, Karaikudi	0	0	0	1	0	1
20	CEERI, Pilani	0	0	0	1	0	1
21	CGCRI, Kolkata	0	0	0	1	0	1
22	CIMAP, Lucknow	0	0	0	1	0	1
23	CLRI, Chennai	0	0	0	1	0	1
24	FPI, Bengaluru	0	0	0	1	0	1
25	IGIB, Delhi	0	0	0	1	0	1
26	IICT, Hyderabad	0	0	0	1	0	1
27	IIM, Jammu	0	0	0	1	0	1
28	IITR, Lucknow	0	0	0	1	0	1
29	IMMT, Bhubaneswar	0	0	0	1	0	1
30	NAL, Bangalore	0	0	0	1	0	1
31	NBRI, Lucknow	0	0	0	1	0	1
32	NEIST, Jorhat	0	0	0	1	0	1
33	NGRI, Hyderabad	0	0	0	1	0	1
34	NIFIST, Thiruvananthapuram	0	0	0	1	0	1
35	NISCAIR, New Delhi	0	0	0	1	0	1
36	NISTADS, New Delhi	0	0	0	1	0	1
37	NML, Jamshedpur	0	0	0	1	0	1

38	NPL, New Delhi	0	0	0	1	0	<b>1</b>
39	SERC, Chennai	0	0	0	1	0	<b>1</b>
40	TKDL, New Delhi	0	0	0	1	0	<b>1</b>
41	TRISUTRA, New Delhi	0	0	0	1	0	<b>1</b>
42	HRDC, Ghaziabad	0	0	0	1	0	<b>1</b>
43	URDIP, Pune	0	0	0	1	0	<b>1</b>
	<b>Total</b>	<b>2</b>	<b>12</b>	<b>1</b>	<b>42</b>	<b>8</b>	

“0” means not using any Web 2.0 application

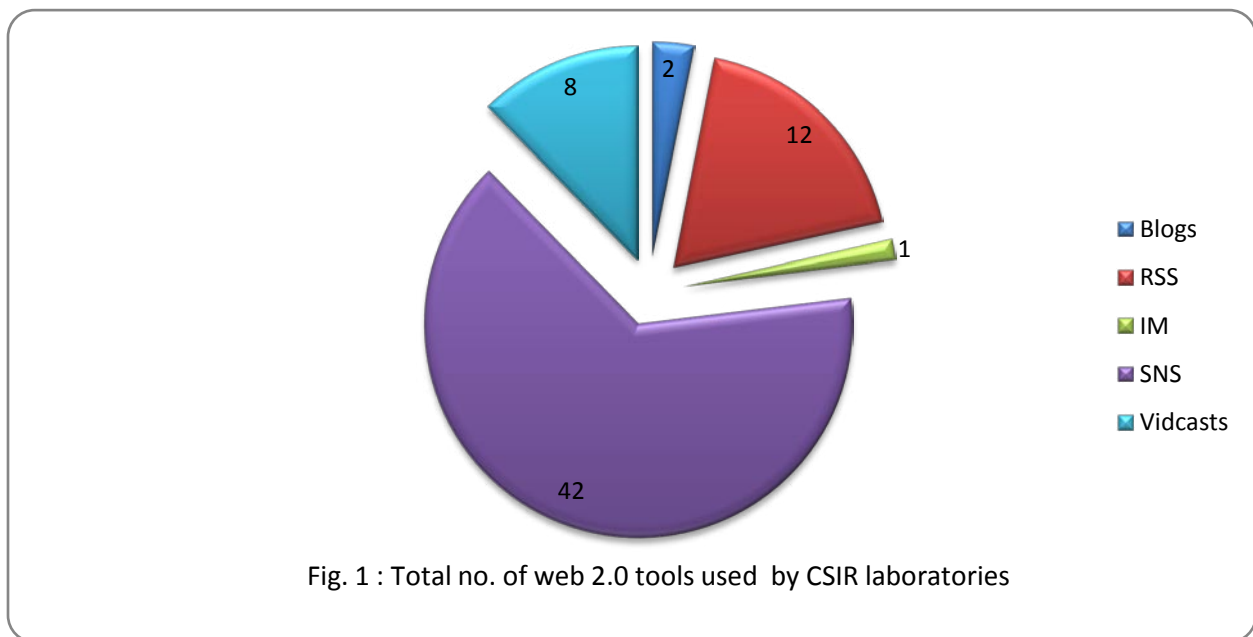


Figure 1 shows web 2.0 tools used by CSIR organizations. It can be interpreted that SNS (social networking sites) is the most popular web 2.0 tools as 42 CSIR laboratories are using it, followed by RSS (12 Laboratories), followed by Vidcasts, Blogs and IM, i.e., 8, 2 & 1 CSIR laboratories respectively.

Table 3 shows that Social Networking Sites (SNS) have been used by maximum 42(97.6%) CSIR laboratories, followed by RSS, Vidcasts, Blogs and IM, i.e., 28%, 19%, 5% & 2.3% respectively. SNS got First rank, followed by RSS, Vidcasts, Blogs and IM, i.e., Second, Third, Fourth and Fifth rank respectively.





Table 3

Analysis of Usage of Web 2.0 tools in CSIR laboratories (Part 1)

Sl. No.	Web 2.0 Tools	Web 2.0 Tools Used in CSIR Institutions Out of 43	Percentage %	Ranking
1	SNS	42	97.60%	1
2	RSS	12	27.90%	2
3	Vidcasts	8	18.60%	3
4	Blogs	2	4.60%	4
5	IM	1	2.30%	5

Table 4

Usage of Social networks in CSIR laboratories (Part 2)

Sl No.	Name	YouTube	Twitter	Facebook	G+	LinkedIn	Total No of SNS
1	CDRI, Lucknow	1	1	1	1	1	5
2	CMERI, Durgapur	1	1	1	1	1	5
3	CBRI, Roorkee	1	1	1	0	1	4
4	CRRI, New Delhi	1	1	1	0	1	4
5	IHBT, Palampur	1	1	1	0	1	4
6	IICT, Hyderabad	1	1	1	0	1	4
7	IMMT, Bhubaneswar	0	1	1	1	1	4
8	IMT, Chandigarh	0	1	1	1	1	4
9	NCL, Pune	1	1	1	1	0	4
10	NEERI, Nagpur	1	1	1	0	1	4
11	NGRI, Hyderabad	1	1	1	0	1	4
12	NML, Jamshedpur	1	1	1	0	1	4



---

---

13	NPL, New Delhi	1	1	1	0	1	4
14	SERC, Chennai	1	1	1	0	1	4
15	CERI, Karaikudi	0	1	1	0	1	3
16	CEERI, Pilani	0	1	1	0	1	3
17	CFTRI, Mysore	0	1	1	0	1	3
18	CGCRI, Kolkata	0	1	1	0	1	3
19	CIMAP, Lucknow	1	1	1	0	0	3
20	IIM, Jammu	0	1	1	0	1	3
21	IITR, Lucknow	0	1	1	0	1	3
22	NAL, Bangalore	0	1	1	0	1	3
23	NEIST, Jorhat	1	1	1	0	0	3
24	NIO, Goa	0	1	1	0	1	3
25	NISCAIR, New Delhi	0	1	1	0	1	3
26	URDIP, Pune	0	1	1	0	1	3
27	CLRI, Chennai	0	1	1	0	0	2
28	CSMCRI, Bhavnagar	0	0	1	0	1	2
29	FPI, Bengaluru	0	0	1	0	1	2
30	IGIB, Delhi	0	1	1	0	0	2
31	IICB, Kolkata	0	1	1	0	0	2
32	IIP, Dehradun	0	0	1	0	1	2
33	NBRI, Lucknow	0	1	1	0	0	2
34	NIEIST, Thiruvananthapuram	0	0	1	0	1	2
35	OSDD, New Delhi	0	1	1	0	0	2
36	TRISUTRA, New Delhi	0	1	1	0	0	2
37	AMPRI, Bhopal	0	0	1	0	0	1
38	CCMB, Hyderabad	0	0	0	0	1	1
39	CIMFR, Dhanbad	0	0	0	0	1	1
40	CSIO, Chandigarh	0	0	1	0	0	1
41	NISTADS, New Delhi	0	0	0	0	1	1



42	TKDL, New Delhi	0	0	1	0	0	1
43	HRDC, Ghaziabad	0	0	1	0	0	1
	Total	14	32	40	5	30	

(0 means not using any web 2.0 tool)

Table 4 shows the social networks (part 2) which are used by CSIR laboratories and it depicted that all 43 CSIR Laboratories are using social networks (Facebook, Twitter, LinkedIn, G+, and YouTube). The maximum social networks are used by CDRI Lucknow and CMERI Durgapur followed by CBRI Roorkee, CRRRI New Delhi, IHBT Palampur, IICT Hyderabad, IMMT Bhubaneswar, IMT Chandigarh, NCL Pune, NEERI Nagpur, NGRI Hyderabad, NML Jamshedpur, NPL New Delhi, SERC Chennai is using 4 and CERI Karaikudi, CEERI Pilani, CFTRI Mysore, CGCRI Kolkata, CIMAP Lucknow, IIIM Jammu, IITR Lucknow, NAL Bangalore, NEIST Jorhat, NIO Goa, NISCAIR New Delhi, URDIP Pune is using 3 and CLRI Chennai, CSMCRI Bhavnagar, FPI Bengaluru, IGIB Delhi, IICB Kolkata, IIP Dehradun, NBRI Lucknow, NIIST Thiruvananthapuram, OSDD New Delhi, TRISUTRA New Delhi and AMPRI Bhopal, CCMB Hyderabad, CIMFR Dhanbad, CSIO Chandigarh, NISTADS New Delhi, TKDL, New Delhi, HRDC, Ghaziabad is using only 1 social networks.

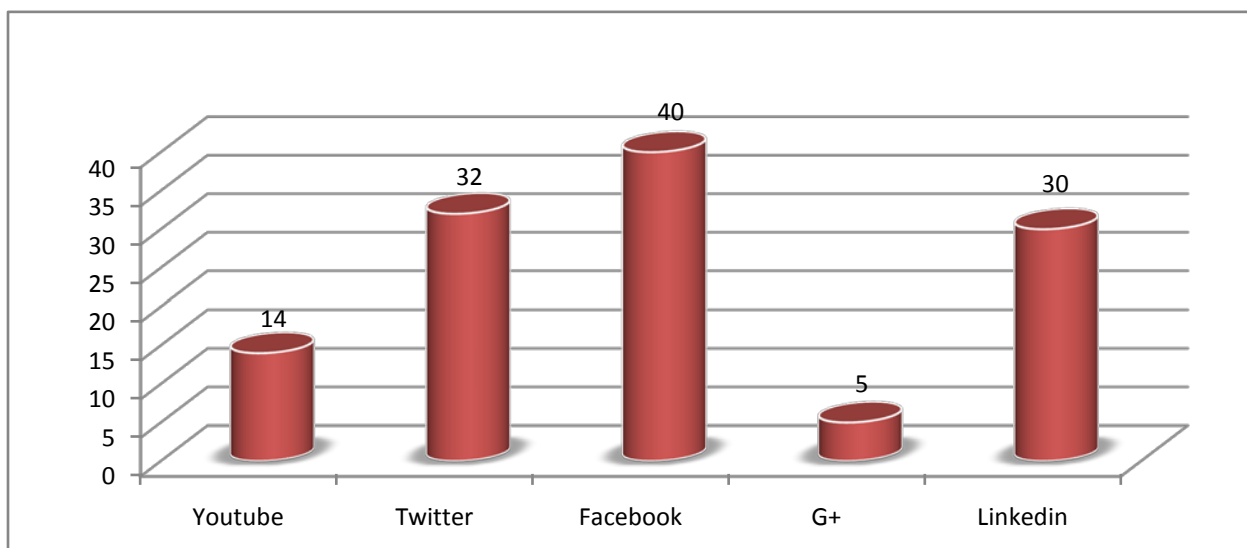


Figure 2: Analysis of usage of Social networking sites (Part 2)

Figure 2 shows that social networking sites used by CSIR laboratories. Analysis revealed that Facebook being the most popular SNS, (40 Laboratories), followed by Twitter, LinkedIn, YouTube and G+, i.e., 32, 30, 14 & 5 Laboratories respectively.

Table 5

Ranking of CSIR laboratories



Sl No.	Name	Total Web 2.0 Tools	Rank
1	CFTRI, Mysore	3	1
2	CMERI, Durgapur	3	1
3	CRRI, New Delhi	3	1
4	IHBT, Palampur	3	1
5	NEERI, Nagpur	3	1
6	OSDD, New Delhi	3	1
7	AMPRI, Bhopal	2	2
8	CCMB, Hyderabad	2	2
9	CIMFR, Dhanbad	2	2
10	CSIO, Chandigarh	2	2
11	CSMCRI, Bhavnagar	2	2
12	IICB, Kolkata	2	2
13	IIP, Dehradun	2	2
14	IMT, Chandigarh	2	2
15	NCL, Pune	2	2
16	NIO, Goa	2	2
17	CBRI, Roorkee	1	3
18	CDRI, Lucknow	1	3
19	CERI, Karaikudi	1	3
20	CEERI, Pilani	1	3
21	CGCRI, Kolkata	1	3
22	CIMAP, Lucknow	1	3
23	CLRI, Chennai	1	3
24	FPI, Bengaluru	1	3
25	IGIB, Delhi	1	3
26	IICT, Hyderabad	1	3



27	IIIM, Jammu	1	3
28	IITR, Lucknow	1	3
29	IMMT, Bhubaneswar	1	3
30	NAL, Bangalore	1	3
31	NBRI, Lucknow	1	3
32	NEIST, Jorhat	1	3
33	NGRI, Hyderabad	1	3
34	NIFIST, Thiruvananthapuram	1	3
35	NISCAIR, New Delhi	1	3
36	NISTAIDS, New Delhi	1	3
37	NML, Jamshedpur	1	3
38	NPL, New Delhi	1	3
39	SERC, Chennai	1	3
40	TKDL, New Delhi	1	3
41	TRISUTRA, New Delhi	1	3
42	HRDC, Ghaziabad	1	3
43	URDIP, Pune	1	3

Table 5 shows the ranking of CSIR Laboratories. CFTRI Mysore, CMERI Durgapur, CRRRI New Delhi, IHBT Palampur, NEERI Nagpur and OSDD New Delhi, ranked first, followed by AMPRI Bhopal, CCMB Hyderabad, CIMFR Dhanbad, CSIO Chandigarh, CSMCRI Bhavnagar, IICB Kolkata, IIP Dehradun, IMT Chandigarh, ICL Pune, NIO Goa ranked second, followed by 27 CSIR Laboratories.

## 8. Conclusion

This study is a search of the Web 2.0 applications in 43 R&D CSIR Laboratories and units websites in India. It was found that all 43 CSIR Laboratories and units have used at least one of the Web 2.0 application listed in Table 2. SNS is used to a great extent, Web 2.0 applications in CSIR laboratories websites and are found in 42 (97.60%), in which Facebook 40(93.02%) is the most popular SNS. The next highly used Web 2.0 application in CSIR laboratories is the RSS (12 out of 97.60) as per this study. IM is least applied Web 2.0 application used by CSIR laboratories. Only 8 CSIR laboratories are using Vidcast (out of 97.60%); Blog is used by only 2 (out of 97.60%) CSIR laboratories.



Web 2.0 technology facilitates endless opportunities, it depends upon the organizations, academic institutions and information centres how they use it. The results states that all the CSIR laboratories are using web 2.0 technologies for promotions of their organisation services and multi-directional sharing of information, videos, images, news, etc. for different academic and research purposes. The Web 2.0 tools offer many opportunities to the students and researchers to share their information speedily at a single click. The web 2.0 provides a great opportunity to all academic institutions and organizations to use these tools to stay connected with each other to provide a variety of services. Collaboration and participation are the most attractive features of Web 2.0 and the trend suggests that Web 2.0 will grow and its utility will increase in academic institution and research organizations. Research organization should adapt these changes judiciously and quickly.

## References

- Ajjan, H., & Hartshorne, R. (2008). Investigating faculty decisions to adopt Web 2.0 technologies: Theory and empirical tests. *The Internet and Higher Education*, 11(2), 71–80. <https://doi.org/10.1016/j.iheduc.2008.05.002>
- Akhtar Hussain. (2015). Adoption of Web 2.0 in library associations in the presence of social media. *Program*, 49(2), 151–169. <https://doi.org/10.1108/PROG-02-2013-0007>
- Al-Kharousi, R., H. Jabur, N., Bouazza, A., & Al-Harrasi, N. (2016). Factors affecting the implementation of Web 2.0 applications in Omani academic libraries. *The Electronic Library*, 34(2), 332–351. <https://doi.org/10.1108/EL-06-2014-0101>
- Allen, B. and Reser, D. (1990), “Content analysis in library and information science research”,
- Arif, M., & Mahmood, K. (2012). The changing role of librarians in the digital world. *The Electronic Library*, 30(4), 469–479. [https://doi.org/10.1108/02640471211252184bkeevil/sigdoc98/checklist/WebCheck\\_Sep13.html](https://doi.org/10.1108/02640471211252184bkeevil/sigdoc98/checklist/WebCheck_Sep13.html) (accessed 1 June 2017)
- Boateng, F., & Liu, Y. Q. (2014). Web 2.0 applications’ usage and trends in top US academic libraries. *Library Hi Tech*, 32(1), 120–138. <https://doi.org/10.1108/LHT-07-2013-0093>
- Boyd, D. M., & Ellison, N. B. (2007). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, 13(1), 210–230. <https://doi.org/10.1111/j.1083-6101.2007.00393.x>
- Chua, A. Y. K., & Goh, D. H. (2010). A study of Web 2.0 applications in library websites. *Library & Information Science Research*, 32(3), 203–211. <https://doi.org/10.1016/j.lisr.2010.01.002>

eBook ISBN, 978-1-4302-0054-3, <http://www.apress.com/us/book/9781430200543>



Emmanuel E Baro, Nelson Edewor, & Godwin Sunday. (2014). Web 2.0 tools: a survey of awareness and use by librarians in university libraries in Africa. *The Electronic Library*, 32(6), 864–883. <https://doi.org/10.1108/EL-11-2012-0151>

Geoghegan, Michael W, Dan Klass : Podcast solutions : the Complete Guide to Podcasting

Joint, N. (2009). The Web 2.0 challenge to libraries. *Library Review*, 58(3), 167–175. <https://doi.org/10.1108/00242530910942027>

Kebede, H. W. (2014). Adoption of Web 2.0 in academic libraries of top African universities. *The Electronic Library*, 32(2), 262–277. <https://doi.org/10.1108/EL-07-2012-0077>

Keevil, B. (1998), “Measuring the usability of your web site”, available at: [www3.sympatico.ca/](http://www3.sympatico.ca/)

Li Si, Shi, R., & Chen, B. (2011). An investigation and analysis of the application of Web 2.0 in Chinese university libraries. *The Electronic Library*, 29(5), 651–668. <https://doi.org/10.1108/02640471111177080>

Library and Information Science Research, Vol. 12, pp. 251-62

Linh, N. C. (2008). A survey of the application of Web 2.0 in Australasian university libraries. *Library Hi Tech*, 26(4), 630–653. <https://doi.org/10.1108/07378830810920950>

Mahmood, K., & V. Richardson Jr, J. (2011). Adoption of Web 2.0 in US academic libraries: a survey of ARL library websites. *Program*, 45(4), 365–375. <https://doi.org/10.1108/00330331111182085>

Mahmood, K., & V. Richardson Jr, J. (2013). Impact of Web 2.0 technologies on academic libraries: a survey of ARL libraries. *The Electronic Library*, 31(4), 508–520. <https://doi.org/10.1108/EL-04-2011-0068>

N.S. Harinarayana, & N. Vasantha Raju. (2010). Web 2.0 features in university library web sites. *The Electronic Library*, 28(1), 69–88. <https://doi.org/10.1108/02640471011023388>

O’Reilly, T. (2005, September). What Is Web 2.0. Retrieved July 14, 2016, from <http://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html>

Research, Vol. 28, pp. 234-97.

Salinas, R. (2006), “A content analysis of Latina web content”, *Library and Information Science*

Tella, A., & Oladapo, O. J. (2016). A comparative analysis of available features and Web 2.0 tools on selected Nigerian and South African university library websites. *The Electronic Library*, 34(3), 504–521. <https://doi.org/10.1108/EL-10-2014-0182>



Xu, C., Ouyang, F., & Chu, H. (2009). The Academic Library Meets Web 2.0: Applications and Implications. *The Journal of Academic Librarianship*, 35(4), 324–331.  
<https://doi.org/10.1016/j.acalib.2009.04.003>

## Annexure 1

*List of CSIR Laboratories, Units and Extension Centers*

Sl. No	Name	Website
1	Advanced Materials and Processes Research Institute (AMPRI), Bhopal	<a href="http://www.ampri.res.in/">http://www.ampri.res.in/</a>
2	Central Building Research Institute (CBRI), Roorkee	<a href="http://cbri.res.in/">http://cbri.res.in/</a>
3	Central Drug Research Institute (CDRI), Lucknow	<a href="http://www.cdri.res.in/">http://www.cdri.res.in/</a>
4	Central Electrochemical Research Institute (CERI), Karaikudi	<a href="http://www.cecriceri.res.in/">http://www.cecriceri.res.in/</a>
5	Central Electronics Engineering Research Institute (CEERI), Pilani	<a href="http://www.ceeri.res.in/">http://www.ceeri.res.in/</a>
6	Central Food Technological Research Institute (CFTRI), Mysore	<a href="http://www.cftri.com/">http://www.cftri.com/</a>
7	Central Glass Ceramic Research Institute (CGCRI), Kolkata	<a href="http://www.cgcri.res.in/">http://www.cgcri.res.in/</a>
8	Central Institute of Medicinal Aromatic Plants (CIMAP), Lucknow	<a href="http://www.cimap.res.in/">http://www.cimap.res.in/</a>
9	Central Institute of Mining and Fuel Research (CIMFR), Dhanbad	<a href="http://www.cimfr.nic.in/">http://www.cimfr.nic.in/</a>
10	Central Leather Research Institute (CLRI), Chennai	<a href="http://www.clri.org/">http://www.clri.org/</a>





11	Central Mechanical Engineering Research Institute (CMERI), Durgapur	<a href="http://www.cmeri.res.in/">http://www.cmeri.res.in/</a>
12	Central Road Research Institute (CRRRI), New Delhi	<a href="http://www.crridom.gov.in/">http://www.crridom.gov.in/</a>
13	Central Salt Marine Chemicals Research Institute (CSMCRI), Bhavnagar	<a href="http://www.csmcri.org/">http://www.csmcri.org/</a>
14	Central Scientific Instruments Organisation (CSIO), Chandigarh	<a href="http://www.csio.res.in/">http://www.csio.res.in/</a>
15	Centre for Cellular Molecular Biology (CCMB), Hyderabad	<a href="http://www.ccmb.res.in/">http://www.ccmb.res.in/</a>
16	CSIR Fourth Paradigm Institute (FPI), Bengaluru	<a href="http://www.cmmacs.ernet.in/">http://www.cmmacs.ernet.in/</a>
17	CSIR-UNIT : Human Resource Development Centre (HRDC), Ghaziabad	<a href="http://www.csirhrdc.res.in/">http://www.csirhrdc.res.in/</a>
18	CSIR-UNIT : Open Source Drug Discovery (OSDD), New Delhi	<a href="http://www.osdd.net/">http://www.osdd.net/</a>
19	CSIR-UNIT : Traditional Knowledge Digital Library (TKDL), New Delhi	<a href="http://www.tkdl.res.in/tkdl/">http://www.tkdl.res.in/tkdl/</a>
20	CSIR-UNIT : Translational Research and Innovative Science ThRough Ayurveda (TRISUTRA), New Delhi	<a href="https://www.igib.res.in/pme/ayurgenomic.htm">https://www.igib.res.in/pme/ayurgenomic.htm</a>
21	CSIR-UNIT : Unit for Research and Development of Information Products (URDIP), Pune	<a href="http://www.urdip.res.in/">http://www.urdip.res.in/</a>
22	Indian Institute of Chemical Biology (IICB), Kolkata	<a href="http://www.iicb.res.in/">http://www.iicb.res.in/</a>
23	Indian Institute of Chemical Technology (IICT), Hyderabad	<a href="http://www.iictindia.org/">http://www.iictindia.org/</a>
24	Indian Institute of Integrative Medicine (IIIM), Jammu	<a href="http://www.iiim.res.in/">http://www.iiim.res.in/</a>
25	Indian Institute of Petroleum (IIP), Dehradun	<a href="http://www.iip.res.in/">http://www.iip.res.in/</a>
26	Indian Institute of Toxicology Research (IITR), Lucknow	<a href="http://www.iitrindia.org/">http://www.iitrindia.org/</a>
27	Institute of Genomics and Integrative Biology (IGIB), Delhi	<a href="https://www.igib.res.in/">https://www.igib.res.in/</a>
28	Institute of Himalayan Bioresource Technology (IHBT), Palampur	<a href="http://www.ihbt.res.in/">http://www.ihbt.res.in/</a>
29	Institute of Microbial Technology (IMT), Chandigarh	<a href="http://www.imtech.res.in/">http://www.imtech.res.in/</a>
30	Institute of Minerals and Materials Technology (IMMT), Bhubaneswar	<a href="http://www.immt.res.in/">http://www.immt.res.in/</a>
31	National Aerospace Laboratories (NAL), Bangalore	<a href="http://www.nal.res.in/">http://www.nal.res.in/</a>
32	National Botanical Research Institute (NBRI), Lucknow	<a href="http://www.nbri.res.in/">http://www.nbri.res.in/</a>



---

---

33	National Chemical Laboratory (NCL), Pune	<a href="http://www.ncl-india.org/">http://www.ncl-india.org/</a>
34	National Environmental Engineering Research Institute (NEERI), Nagpur	<a href="http://www.neeri.res.in/">http://www.neeri.res.in/</a>
35	National Geophysical Research Institute (NGRI), Hyderabad	<a href="http://www.ngri.org.in/">http://www.ngri.org.in/</a>
36	National Institute For Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram	<a href="http://www.niist.res.in/english/">http://www.niist.res.in/english/</a>
37	National Institute of Oceanography (NIO), Goa	<a href="http://www.nio.org/">http://www.nio.org/</a>
38	National Institute of Science Communication And Information Resources (NISCAIR), New Delhi	<a href="http://www.niscair.res.in/">http://www.niscair.res.in/</a>
39	National Institute of Science, Technology And Development Studies (NISTADS), New Delhi	<a href="http://www.nistads.res.in/">http://www.nistads.res.in/</a>
40	National Metallurgical Laboratory (NML), Jamshedpur	<a href="http://nmlindia.org/">http://nmlindia.org/</a>
41	National Physical Laboratory (NPL), New Delhi	<a href="http://www.nplindia.org/">http://www.nplindia.org/</a>
42	North - East Institute of Science and Technology (NEIST), Jorhat	<a href="http://www.neist.res.in/">http://www.neist.res.in/</a>
43	Structural Engineering Research Centre (SERC), Chennai	<a href="http://www.serc.res.in/">http://www.serc.res.in/</a>