

**Enhancing the e-visibility status of environmental science researchers at the University of South Africa  
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**Abstract**

Knowledge sharing in academia has become increasingly important for researchers with their research online profiles becoming the vehicle of choice to advancing their research e-visibility. The proliferation of social networking tools with a research focus have become ideal online research communities for promoting the online presence and discoverability of a researcher and enhancing the accessibility of the researcher's research output. This paper reports on the e-visibility themes 1) online presence, 2) researcher discoverability, and 3) accessibility of research output, of the environmental science researchers (SES) at the University of South Africa as part of a longitudinal e-visibility study during the period 2014 and 2016. The investigation into research e-visibility focused on the factors contributing to the increase in research e-visibility and the promotion of knowledge sharing. The

e-visibility indicators represented via the bibliometric and altmetric data were sourced and collected from the appropriate tools i.e. bibliometrics from Web of Science, Scopus and Google Scholar; and the altmetric data collected from academic social networking tools i.e. ResearchGate, Academia.edu and Mendeley. The results indicate that the exposure to an e-visibility awareness strategy show an overall increase in the e-visibility indicators for the SES researchers with an increase in the net research online presence of 10.3%; the net researcher discoverability indicators increasing with 28%; and the research output accessibility indicators increasing with 18.3%. Altmetrics and bibliometrics become valuable indicators for measuring the research e-visibility of researchers in academia. This study found that e-visibility awareness, as part of an e-visibility strategy, enhanced research e-visibility, thereby increasing the research online visibility, the researcher's discoverability, and the accessibility of the research output of the SES researchers at University of South Africa. Knowledge sharing in academia is increasingly advanced as researchers embrace these online research

communities and the realization of the value of their research e-visibility.

**Keywords:**

E-visibility, research online presence, researcher online discoverability, research output accessibility, research e-profiles.

**1 Introduction**

Lawrence (2001) stated that research available online is more likely to be cited up to 4.5 times more than research in print format and not available online, therefore introduced the notion that research available online enhances the citation counts of researchers. This implies that research that is not available and retrievable online is less likely to be discovered and accessed by like-minded researchers for utilization in research. This further implies that the research output is not accessible online in full-text format for utilization is invisible to researchers. The concept of e-visibility embodies the research online presence of the researcher on the Web, the researcher's discoverability via research e-profiles on the Web, and research output accessibility of the researcher available online on various research communities (Adriaanse & Rensleigh, 2017). Knowledge sharing in academia has become increasingly important for researchers and the proliferation of online academic social networking tools have introduced research activities and practices with researchers increasingly embracing the novel research workflow on online research communities. Online research profiles have become options for researchers to advancing their research e-visibility to actively manage a uniquely identifiable online research persona with focus (Jeng, He and Jiang; 2015). These research e-profiles allow researchers to actively engage, participate and disseminate research on the online research communities with functionality of linking to the researcher's research output ensuring the online availability and accessibility (Menendez, Angeli & Menestrina 2012; Arda, 2012; Goodier & Czerniewicz 2012; Redden, 2010; Lin & Tsai 2011; Mangan 2012).

The research presented for this paper forms part of a more extensive PhD comparative longitudinal e-visibility study covering a two-year period, which is aimed at the development of an e-visibility strategy for the environmental sciences researchers (SES) at University of South Africa (Unisa). The study on e-visibility study encompassed altmetric-bibliometric data collection and this paper reports on the changes in the e-visibility status of the SES researcher focussing on the results obtained from altmetric and bibliometric data collected (Data A from December 2014 and Data E from December 2016) at the beginning of the study and at the end of the study. The objectives of this paper includes determining the e-visibility status of the SES researchers at the beginning and the end of the study and reporting the e-visibility trends which specific focus on the e-visibility themes i.e. research online presence, researcher discoverability, and research output accessibility.

The premise presented is that the research e-visibility of researchers can be enhanced by increasing the research online presence of researchers; increasing the researcher's discoverability via research e-profiles on citation resources and academic social networking tools; and increasing the research output accessibility of the researcher. Knowledge sharing is advanced by increasing the research e-visibility of researchers in academia.

**2. Literature review**

**2.1 Research e-visibility**

Research e-visibility, embodies three themes, namely the online presence of researchers and their research output, the discoverability of researchers, and the accessibility of their research output (Adriaanse and Rensleigh, 2017).

Research online presence can be described as the online representation of a researcher on various websites, online subject databases and academic social networking tools. Chung and Park (2012) encourages researchers and their research output to be more visible to all possible online audiences.

Researcher discoverability can be described as the researcher discoverability when a researcher is searched for by other researchers online via research e-profiles on various websites, online subject databases and academic social networking tools. The discoverability of a researcher translates to the ease of the researcher being discovered by other researchers using online search engines (i.e. Google), online subject databases (i.e. Science Direct) and academic social networking tools (i.e. ResearchGate) (Ale-Ebrahim, Salehi, Embi, Tanha, Gholizadeh, Motahar, & Ordi, 2013; Norman, 2012).

Research output accessibility can be described as the accessibility of the research output of the SES researchers on various websites, online subject databases and academic social networking tools. It implies that the researcher's research output, which is published scholarly research, is discoverable on online platforms via the Internet. Czerniewicz and Wiens (2013) suggest that research publications should be retrievable and

downloadable for other researchers to peruse and cite, which in turn implies accessibility. This translates to research output being stored online for dissemination and archival purposes on platforms and in repositories, and being accessible via the Internet.

Research should be online, discoverable and accessible (Ale-Ebrahim et al., 2013; Norman, 2012). Becoming e-visible therefore involves researchers promoting and managing their research persona and research output online. It is generally accepted that research performance is measured by citation counts and related bibliometrics (Bornmann, 2014a, 2014b; Brody, Harnad & Carr, 2006; Czerniewicz and Wiens, 2013; Lawrence, 2001; Roemer and Borchardt, 2012). The more discoverable you are as a researcher, the more your research can be accessed, downloaded and by implication, the research output can be cited. A higher citation rate translates to higher research performance, which in turn means increased research impact on the subject discipline. Traditionally research performance metrics only included bibliometrics, which represents the research impact of published research output. The new trend includes altmetrics, which is derived from the attention the research output is receiving from social networking websites, and academic social networking tools, as a more inclusive approach to research performance. In order for your research to be used and cited, it needs to be discoverable and accessible, and researchers should be more e-visible.

In order to identify the e-visibility status of the SES researchers, it is necessary to investigate the e-visibility themes of the SES researchers using the e-visibility indicators sourced from the citation resources and the academic social networking tools.

The researcher's online presence is represented in the form of comprehensive research e-profile with pertinent accurate research information promoting their visibility to wider audiences on online research communities (Ale-Ebrahim et al., 2013; Arda, 2012; Chung and Park, 2012; Hoffman, Lutz and Meckel, 2014; Norman, 2012; Ward, Bejarano and Dudás, 2015). This allows researchers to be more discoverable and research output to be accessible and downloadable via this research e-profile (Ale-Ebrahim et al., 2013; Norman, 2012). Enhancing e-visibility involves a researcher promoting his/her research persona and research output online. It is suggested that the more discoverable a researcher is, the more such researcher's research can be accessed, downloaded, used and cited. Further, the higher citation rate translates to higher research performance, which in turn means increased research impact on subject discipline. E-visibility as a philosophy would then lead to increased research performance and research impact. Persson and Svenningsson (2016) state that the increased distribution of research output on academic social networking tools would lead to an increase in research impact. It is therefore prudent for an e-visibility strategy be implemented to help increase researchers' e-visibility.

### **3 Research Methodology**

This paper aims at reporting the change of the e-visibility status of the School of Environmental Sciences (SES) researchers at Unisa during 2014 and 2016 as part of the e-visibility study of a longitudinal exploratory study (December 2014 to December 2016) with the purpose of creating an e-visibility strategy for the enhancement of e-visibility the for SES researchers at the University of South Africa.

The data collected included altmetric and bibliometric quantitative data pertaining to SES researchers and their e-visibility during December 2014 and December 2016. The altmetric and bibliometric data were collected via online searches on the websites selected from existing research literature. The search strategy included using the SES researcher's name as keyword for retrieving and collection of all relevant bibliometric and altmetric data.

For the purpose of reporting for this paper, e-visibility as a concept incorporates the following objectives illustrated in the themes: 1) Online research presence; 2) Researcher discoverability, and 3) Accessibility of research output, which will form the reporting categories for e-visibility. The three e-visibility themes translate into e-visibility indicators, which comprises of the bibliometric and altmetric data of the SES researchers. Table 1 gives a summary of the e-visibility indicator data collected for the SES researcher during the period December 2014 and December 2016.

The research online presence indicator data were sourced from various websites, online subject databases and academic social networking tools represented by five categories as seen in Table 1. Using the collected data, the research online presence can be expressed as the percentage of online representation of a researcher on various websites, online subject databases and academic social networking tools. The growth in research

online presence was calculated by subtracting the percentage of research online presence at the start of study in December 2014 from the percentage of research online presence at the end of in December 2016.

The researcher discoverability indicator data were sourced from various websites, online subject databases and academic social networking tools represented by the three categories of research e-profiles i.e. traditional, academic social networking and professional. Using the collected data, researcher discoverability can be expressed as the percentage of the researcher discoverability across various websites, online subject databases and academic social networking tools. The growth in researcher discoverability was calculated by subtracting the percentage researcher discoverability at the start of the in 2014 from the percentage researcher discoverability in 2016 representing the end of the study.

The research output accessibility indicator data were sourced from various websites, online subject databases and academic social networking tools represented by 3 categories of research e-profiles. Using the collected data the research output accessibility can be expressed as the percentage of research accessible for downloading and retrieving compared to the total research publications per researcher. The data collected during the two-year period pertinent to research output that was linked and available for retrieving/downloading was indicative of accessibility. The growth in research output accessibility was calculated using the percentage of research output accessibility fat the beginning of the study in 2014 from the percentage research output accessibility at the end of the study in 2016.

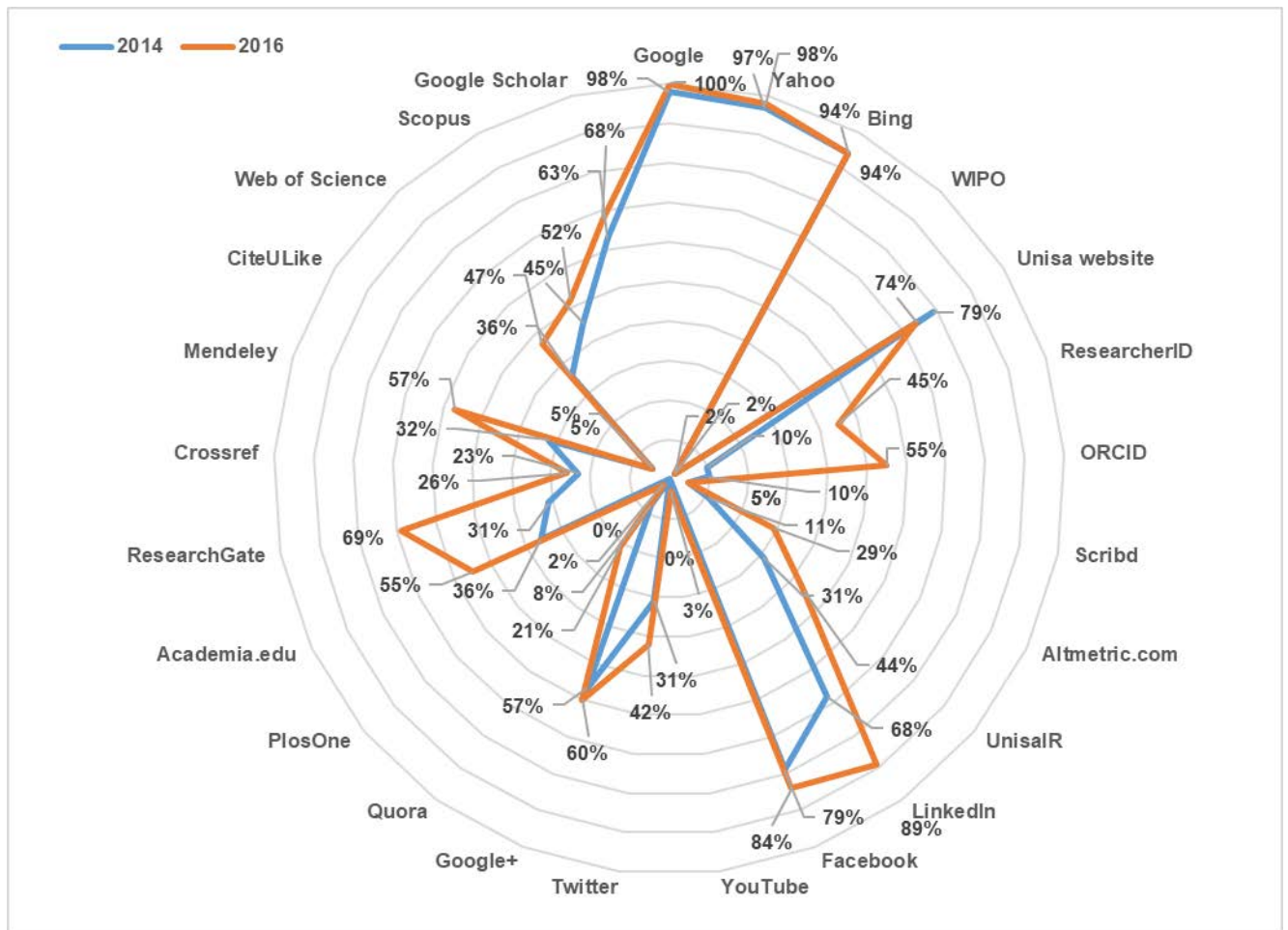
#### **4 E-visibility results and discussion**

##### *4.1 Results and analysis of the e-visibility theme: Research online presence*

The research online presence results of the SES researchers as represented over the selected 25 general Internet websites and social networking tools during the two-year period between 2014 and 2016, will be reported and discussed, namely percentage of research online presence of researchers and increase in research online presence. The investigation of research online presence of the SES researchers reveals that the highest percentage of research online presence across the 25 Internet websites was Google with 100%.

The category general websites from December 2014 to December 2016 regarding research online presence, shows the highest increase is evident in ORCID (45%) followed by ResearcherID (36%) and Altmetric.com (18%). In the category repositories and online archives, increased by 13%. In the category of social networking tools, the research online presence distribution of the SES researchers indicates an increase of 21%. The category of social networking tools, indicated the largest increase on LinkedIn (21%) followed by Quora (13%) and Twitter (11%) regarding research online presence. Regarding the research online presence in academic social networking tools, the highest increase (38%) was reported on ResearchGate followed by 19% for Acadeia.edu. In the category of reference management tools, the largest increase for the research online presence was reported on Mendeley (24%) followed by Crossref (3%). The research online presence in the category of traditional citation resources indicates the largest increase for Web of Science (11%) followed by Scopus (6%) and Google Scholar (5%).

Figure 1 gives a graphic representation of the research online presence of SES researchers between the period 2014 and 2016.



**Figure 1: Actual research online presence representation of SES researchers between 2014 and 2016**

#### 4.2 Discussion of research online presence

The largest increase regarding research online presence, was reported on ORCID (45%) followed by ResearchGate (38%) and ResearcherID (36%). Given the results from above, the total research online presence of SES researchers from December 2014 (39%) to December 2016 (49%) reflects a net increase in total averages of 10%. It can therefore be deduced that because research online presence is a theme of e-visibility, an increase in research online presence of the SES researchers reflects an increase in the e-visibility of the SES researchers.

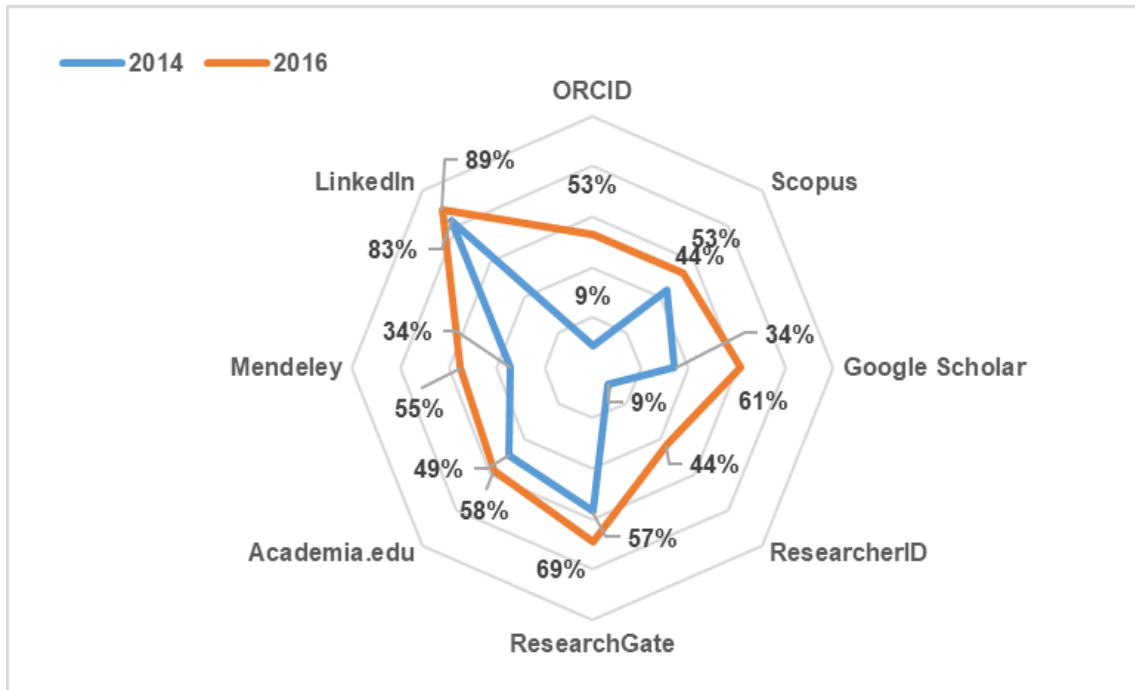
#### 4.3 Results and analysis of the e-visibility theme: Researcher discoverability

The results for researcher discoverability (e-profiles) were obtained from the data sets regarding online e-profiles of SES researchers, collected from December 2014 to December 2016 from are three categories representing researcher discoverability of the SES researchers: Traditional research e-profiles, Academic social networking research e-profiles, and Professional research e-profile.

The majority of the 62 participating SES researchers with 3 or more research e-profiles increased from 27 (43.5%) in 2014 to 49 (79%) in 2016. SES researcher with two research e-profiles decreased from 13 (21%), in 2014 to 6 (9.7%) in 2016. The results further show that the SES researchers with one research e-profile decreased from 13 (21%) to five (8.1%) in 2016. The SES researchers with zero research profiles decreased to six (6.5%) to two (3.2%) in 2016. The results illustrate an increase in multiples e-profiles for the SES researchers across selected websites, online subject databases and academic social networking tools.

The results regarding the distribution of the research e-profiles of the 62 participating SES researchers across the selected websites, online subject databases and academic social networking tools were presented according to the three categories, i.e.: 1) traditional research e-profiles, 2) academic social networking e-profiles and 3) professional research e-profiles.

The results indicate an increase in the researcher discoverability for the SES researchers from 32% in 2014 to 60% in 2016 and therefore reflects a net increase of 28%. Further, the results show an increase in all the research e-profiles. The largest increase between 2014 and 2016 in research e-profiles was 44% on ORCID. Figure 2 illustrates the distribution of the research e-profiles indicates an overall increase in all research e-profiles. The largest proportion of research e-profiles for 2014 was LinkedIn with 83%, with the smallest proportion represented by ORCID and ResearcherID with 9% each. The results show that in 2016, LinkedIn still constituted the largest proportion of research profiles with 89%, with ResearcherID the least proportion of research profiles with 44%.



**Figure 2: Actual researcher discoverability representation of SES researchers between 2014 and 2016**

#### 4.4 Discussion of researcher discoverability

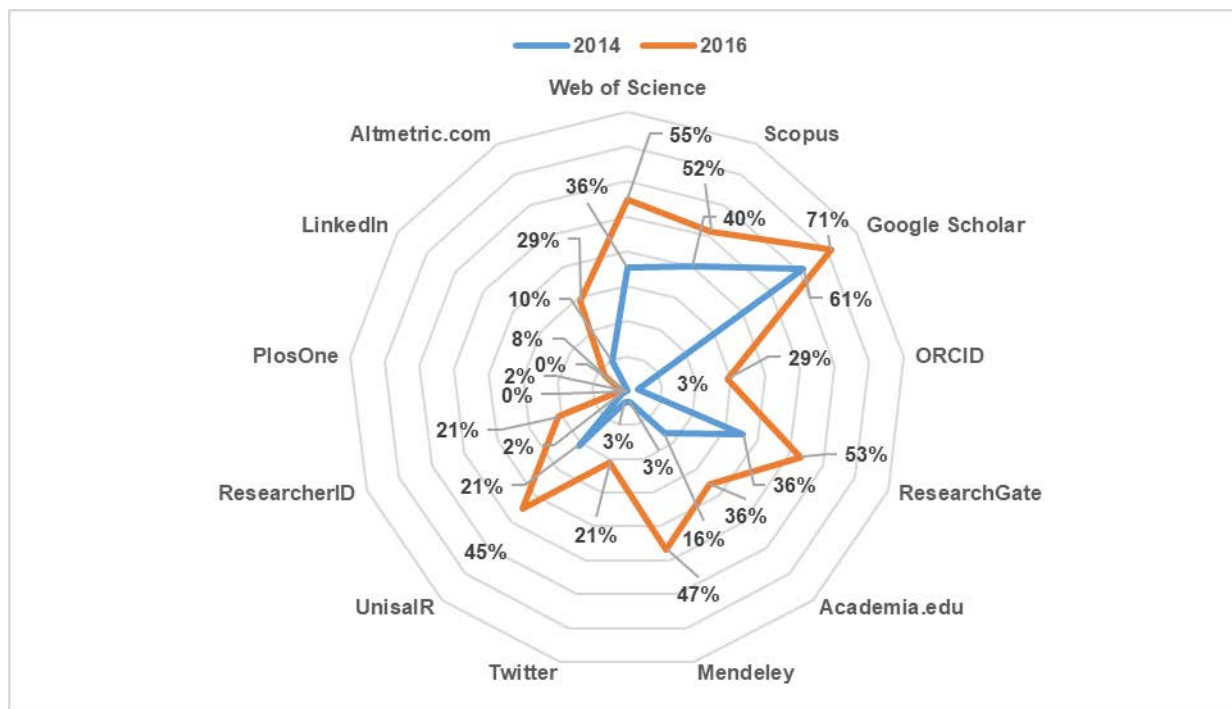
The researcher discoverability of researchers reflects the online locations where the SES researchers created research e-profiles on websites, online subject databases and academic social networking tools. The results for the researcher discoverability for the SES researchers reflects a 28% total increase during the period from 2014 to 2016. It can therefore be deduced that because researcher discoverability is a theme of e-visibility, an increase in researcher discoverability of the SES researchers reflects an increase in the e-visibility of the SES researchers.

#### 4.5 Results and analysis of the e-visibility theme: Research output accessibility

The results for research output accessibility was determined by extracting data regarding research output of SES researchers on citation resources, websites and academic social networking tools for research purposes, during December 2014 and December 2016. The data were collected from across the following citation resources, websites and social networking tools: Web of Science, Scopus, Google Scholar, ORCID, ResearchGate, Academia.edu, Mendeley, Twitter, UnisaIR, ResearcherID, PlosOne, LinkedIn, and Altmetric.com.

The largest number of publications linked or uploaded online was 102 in 2014 compared to 116 in 2016. The results indicate that in 2016, Google Scholar reported the widest coverage of available publications (588), followed by ResearchGate (560) and Scopus (286). Mendeley indicated the highest net increase in research output accessibility with 44% between 2014 and 2016, followed by ORCID with 26%, UnisaIR with 24%. PlosOne reported the smallest net increase with 2%. The total net increase in research output accessibility for the SES researchers between 2014 (18%) and 2016 (37%) was 19%.

Figure 3 represents the accessibility theme of the e-visibility status of the SES researchers at the beginning of the study in December 2014 and at the end of the study in December 2016.



**Figure 3: Research output accessibility representation of SES researchers from 2014 to 2016**

#### 4.6 Discussion of research output accessibility

Research output accessibility as an e-visibility theme manifests as the presence of the SES researcher's research output on the 13 selected Internet websites and social networking tools allowing for linking or uploading of research output. The widest coverage of available publications was represented on Google Scholar (588 publications in total) with the least being on PlosOne (one publication in total). Hilbert Barth, Gremm, Gros, Haiter, Henkel, Reinhardt and Stock (2015) also found that Google Scholar represented the widest coverage of available publications.

#### 4.7 E-visibility indicator data results and discussion

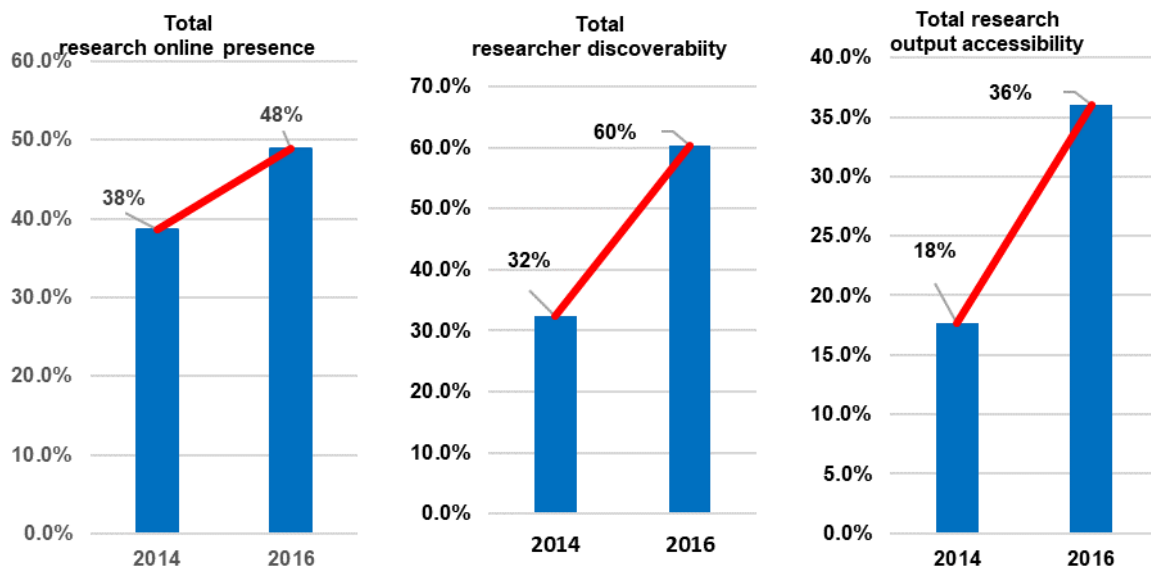
The results obtained from the e-visibility indicator data analysis are based on the e-visibility themes: research online presence, researcher discoverability and research output accessibility.

The results reflecting the research online presence of the SES researchers incorporate the following categories: general websites, repositories and online archives, social networking tools, academic social networking tools, reference management tools and traditional citation resources, reflect a net increase in total averages of 10% from December 2014 to December 2016. It can therefore be deduced that because research online presence is a theme of e-visibility, the increase in the research online presence of the SES researcher indicates and increase in the e-visibility of the SES Researchers.

The results reflecting the researcher discoverability of the SES researchers incorporate research e-profiles in the following categories: Traditional research e-profiles, academic social networking e-profiles, and professional research e-profiles, reflect a net increase of 28% increase in researcher discoverability for the SES researchers from December 2014 to December 2016. It can therefore be deduced that because researcher discoverability is a theme of e-visibility, the increase in the researcher discoverability of the SES researcher, indicates an increase in the e-visibility of the SES Researchers.

The results reflecting the research output accessibility of the SES researchers reflect a net increase of 18% increase in research output accessibility for the SES researchers from December 2014 to December 2016. It

can therefore be deduced that because research output accessibility is a theme of e-visibility, the increase in the research output accessibility of the SES researcher indicates and increase in the e-visibility of the SES Researchers.



**Figure 6: Representation of the research e-visibility of SES researchers for 2014 and 2016**

The benefits to enhancing e-visibility regarding research online presence includes the opportunity for researchers to boost their research profile by establishing an online persona (Bik and Goldstein, 2013; de Ridder et al., 2013; Gasparyan et al., 2017) and manage their research e-profiles actively online (Goodier and Czerniewicz, 2012). The benefits to enhancing e-visibility regarding researcher discoverability includes researchers to participate, communicate and belong to research related professional networking and collaboration communities and therefore gaining recognition in their subject discipline (Bik & Goldstein, 2013; Goodier & Czerniewicz, 2012; Jeng et al., 2015; Mangan, 2012). The benefits to enhancing e-visibility regarding research output accessibility includes researchers to disseminate and share their research output to enhance visibility of research output via online research communities (Bik & Goldstein, 2013; Mangan, 2012). Ale-Ebrahim, Salehi, Embi, Tanha, Gholizadeh and Motahar (2014) and Lawrence (2001) stress that research output visible online tend to receive more downloads and citations. The increased online visibility and accessibility of research output allows for the tracking of research metrics (Bibliometrics and altmetrics via altmetrics aggregators) and research metrics analysis. This translate to improving the traditional impact (bibliometrics) and societal impact (altmetrics) (Bik & Goldstein, 2013; Ward et al., 2015).

### 5 Conclusions and Recommendations

The objective of this study is to investigate the e-visibility indicators of the SES researchers at the University of South Africa using the e-visibility themes: online presence, researcher discoverability and accessibility of research output of the SES researchers, and report on the change in the e-visibility status of the SES researchers.

Research e-visibility in essence encapsulates the concepts of research online presence of a researcher on the Web, researchers' discoverability via online research e-profiles and research output accessibility of the SES researchers available online for downloading and retrieval. Ideally high percentages of research online presence, high percentages of researcher discoverability and high percentages of research output accessibility translates to high levels of research e-visibility. An increase was reported across the e-visibility themes of research online presence, researcher discoverability and research output accessibility. There was therefore an increase of all the e-visibility themes, and thus an increase in e-visibility of the SES researchers at Unisa. Figure 6 illustrates the e-visibility status of the SES researchers representing research online presence, researcher discoverability and research output accessibility.



Given the results obtained from the bibliometric altmetric data results collected during December 2014 and December 2016 for the investigation of the e-visibility indicators of the SES researchers, indicating an increase across all three e-visibility themes, the e-visibility strategy developed and implemented during 2014 and 2016 enhanced the e-visibility of the SES researchers at Unisa. Enhancing e-visibility involves a researcher promoting and managing his/her research persona and research output online. It is suggested that the more discoverable a researcher is, the more such researcher's research can be accessed, downloaded, used and cited. Further, the higher citation rate translates to higher research performance, which in turn means increased research impact on subject discipline. The increase in research e-visibility advances knowledge sharing in academia allowing researchers to increasingly embrace the interaction on online research communities to by maximizing their research online presence, researcher discoverability and research accessibility.

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