A Study on the Measure for Improving the Website of ScienceON*

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ABSTRACT

This study was conducted for the purpose of deriving the existing ScienceON elements and reorganizing them to increase user convenience and utilization. Towards this end, implications were derived by analyzing the current status of the ScienceON's website, case studies and analysis of major similar institution websites, and user satisfaction surveys. Based on the derived contents, key terms were analyzed and redefined, the menu system was reorganized, and the menu names were redefined, and the menu system was reorganized to match the direction and identity of the redefined ScienceON. The study results based on such are as follows. First, the ScienceON's brand selection criteria and direction were based on service sustainability, service inclusiveness, recognition of portal characteristics, user friendliness and intuitiveness. Considering the meaning of branding, branding strategy, and selection criteria for ScienceON branding, ScienceON, Ontong ScienceON, ScienceONPlatform, science information portal, ScienceON, Mecca of science and technology information, and 5 brand names such as ScienceON were proposed. Second, to improve accessibility, usability, and satisfaction, it would be necessary to redefine current terms. Towards this end, it would be necessary to change the terminology of knowledge infrastructure search and to unify and organize the terminology. Third, in the current menu, the services provided as analysis services and curation services are organized in the beta service menu, and data such as papers, patents, reports, and trends are also serviced only through integrated search, and hence, each data type and service type classification must be improved.

1. Introduction

While much information is created, it has become a social task today to discriminate between garbage data and non-garbage data. Amidst which, various research resource platforms play a role in selecting, refining, and providing the data which the researchers need. Domestically and internationally, there exist research resource sharing platforms which provide various data by academic field

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and information type.

Among which, ScienceON is a science and technology information portal operated by the Korea Institute of Science and Technology Information, providing the knowledge infrastructure needed by researchers in a single place by connecting and converging national R&D information, research data, information analysis service, and research infrastructure. Furthermore, it provides a variety of services that do not exist on other portals, such as thesis timeline, AI thesis summary, and thesis Q&A, while striving for a continuous development as a customized content platform, such as by planning metaverse (Soohyeon Yoo, Hyeonjeong Kim, & Mihwan Hyeon, 2021).

It is a service which provides the knowledge infrastructure needed by researchers in a single place by connecting and converging science and technology information, research data, information analysis service, and research infrastructure with science and technology knowledge infrastructure. Researchers can discover ideas, grasp funding information, conduct experiments, and perform tasks Knowledge infrastructure necessary for each stage of R&D, such as implementation, sharing and collaboration, performance creation, and technology transfer, which may be guided, provided, and utilized.

Recently, the convergence service center of KISTI, the operator of ScienceON, is carrying out a project to build an integrated service platform for intelligent science and technology knowledge infrastructure. It was also revealed that the ScienceON's website is scheduled to be reorganized for the successful promotion.

Towards this end, in this study, as it would be necessary to organize the menu system and terminology of the ScienceON's website and present directions for improvement, it is used to reorganize the ScienceON's website to improve user accessibility, usability, and satisfaction, thereby expanding the influx of new users to ScienceON. and to improve the usability of existing users.

Hence, in this study, for the purpose of deriving the existing ScienceON elements and rearranging them for increased user convenience and utilization, analysis and redefinition of key terms in ScienceON and key terms (menu names, entered in descriptions for each service) in accordance with the direction and identity of the redefined ScienceON words, etc. Furthermore, after reorganizing the ScienceON's menu system and redefining the menu name, the menu system was reconstructed according to the direction and identity of the redefined ScienceON.

2. Theoretical Background (Previous Studies)

First, as a study related to private information search portals, Soyeon Park (2010) compared and analyzed multimedia search services and service classification systems of domestic and foreign portals. Consequently, search services of domestic portals such as Naver turned out to be not user-friendly compared to overseas search services, and improvements were found to be necessary (Soyeon Park, 2010). To improve it, the portal was improved to ensure that the users could easily find the service they wanted from the portal, and through a user perception survey, essential elements of the portal that users preferred were derived. As a result of the derivation, it turned out that the provision of information and the distribution of information are the elements that users prefer in portals, and the satisfaction of the users using portals was improved by strengthening the competitiveness of search

services and the publicity of search portals (Soyeon Park, 2013). In the same context, Moongi Seo (2012) found that in the user environment model for evaluation models of portal search services, the user's search cycle, demand, and ability appear as essential elements of search behavior, and socio-demographic factors such as gender and age, claiming that search behavior demonstrated more deviations than social and economic factors such as job, education, and income. Furthermore, in terms of performance indicators with user satisfaction as a dependent variable, the degree of relevance between search purpose and results appears to be relatively more meaningful than other performance indicators of search behavior. Yangwoo Kim (2017) investigated the students' academic information search satisfaction based on the NAVER's academic data search function. Consequently, it turned out that the users are experiencing a lot of inconvenience due to the limitations of the search system, and the limited knowledge of related terms of portal users was also a large problem. Based on which, improvement of the search system and user-centered interface were proposed, while the need was claimed for providing search help and user education to help the users with inadequate search skills.

Meanwhile, since 2012, with the spread of mobile services and the activation of mobile portals, research on search portal services has been actively conducted (Gwiyeol Ryu, 2018). As a result of a user perception survey on mobile portals, search contents were lacking compared to computers, and it turned out that the user interface and search function were poor, requiring much reinforcement (Soyeon Park, 2014). Furthermore, Seow (2008) specified that the maximum waiting time for mobile portal users to search is 7 to 10 seconds, and as a result of analyzing the mobile search response times of Naver, Daum, and Nate, the average response time was too long, which caused great inconvenience to the users. and urged for fast improvement (Gwiyeol Ryu, 2018).

In addition to which, if ScienceON, the subject of this study, represents the field of science, it may be said that it represents the humanities and social sciences of NKIS, and hence, the previous studies related to such were also investigated. First, the studies related to the improvement of NKIS were conducted several times by the Economics, Humanities and Social Sciences Research Council, followed by a study on establishing a plan to establish a national policy knowledge system for managing research results in 2011 and a study on how to establish a platform for policy diffusion of research results in 2020. The 2011 study on the establishment of the national policy knowledge system establishment plan for the management of research results was carried out as part of the research group informatization project to examine and understand the progress and future promotion plans of the national policy knowledge system, and by deriving the operational plan fr the national policy research hub and national policy research portal, a developmental plan for the National Policy Knowledge System for the management and dissemination of advanced national policy knowledge was presented. Towards this end, the current status of the establishment of the national policy research hub and the future promotion plan of the national policy research portal were identified, and the areas to be improved and added in the 3rd informatization project are diagnosed by diagnosing the current location of the national policy research hub that has been established through the 2nd informatization project. and presented a plan to establish a standardized system for efficient integration, processing, and utilization of research performance information in the national policy research hub, and a plan to establish a plagiarism management system to strengthen research ethics.

Furthermore, through the diagnosis of IKIS, the predecessor of NKIS, problems were derived

and reflected to provide the effective national policy research integrated services to help improve the satisfaction of the users of the national policy research portal, and detailed operational plans such as specialized performance exhibition halls and website development plans. Moreover, by introducing the concept of an institutional repository and creating a national policy knowledge map through a research performance analysis system, an integrated management and service establishment plan for intelligent research performance was established (Jiyeon Lee et al., 2011). Since then, the research on how to establish a platform for policy diffusion of research achievements in 2020 will go further and create additional value through online communication between the research society and research institutes, which are information providers, and the public, who are information consumers, and the policy as a platform model for diffusion was proposed. Towards this end, the current status of research output production and management of research groups and research institutes was checked, and problems and limitations of NKIS were analyzed through user perception surveys, etc., and improvement items were preceded. Furthermore, to establish a clear platform identity based on NKIS, the success factors of the platform are reviewed, and the characteristics and strengths of each platform are analyzed to present specific strategies and improvement tasks necessary for establishing a platform model (Geonyoung Kim et al., 2020).

Thereafter, Younghee Noh et al. (2021) conducted a study on the direction of improvement of service improvement and promotion based on user perception analysis on the National Policy Research Portal (NKIS). The direction of improvement proposed based on the research results presented to them is: First, it would be necessary to investigate the demand for the users by occupational group and age and to set clear targets for the main NKIS users. Second, efforts are needed to spread the policy information and services. Third, while maintaining the direction of public relations, it would be necessary to improve and revitalize the public relations method through the introduction of new media. Younghee Noh et al. (2022) need to conduct a study on deriving operational improvement measures through analysis of the current status and case studies of the National Policy Research Portal (NKIS), and there is a need to increase the demand for policy information such as the creation of public-friendly policy reports, infographics, and easy-to-use information delivery. Second, it would be necessary to provide customized services by strengthening reports and policy data on social issues and educational topics, which are the interests of the main user base, in consideration of the proportion of visiting jobs. Third, to diversify and expand the video data service, it would be necessary to prepare alternatives such as encouraging uploading of video data held by the relevant institution and setting regulations. Fourth, it was proposed that the overall public relations service needs to be improved.

Other similar studies include a study on how to build a one-stop portal service for humanities and social assets conducted by Younghee Noh, Daegeun Jeong, and Woojeong Kwak (2018), and a study on the quality of Internet portal academic information service conducted by Seonghee Kim and Haejin Park (2014).

3. Research Design and Methodology

This study analyzed the menu system and terminology of the ScienceON's website, and analyzed

the existing user satisfaction and similar cases for the successful promotion of the ‘intelligent science and technology knowledge infrastructure integrated service platform establishment’ project being carried out by the Convergence Service Center for the purpose of improving the menu system and terminology of the ScienceON’s website. For the study, the first ScienceON’s website operation status analysis was conducted. To analyze the current status, menu structure analysis, function analysis, and definition of terms in the website were analyzed. Second, the status and case analysis of similar services domestic and abroad was conducted. The domestic research portals and similar institutions such as NKIS, NTIS, PRISM, NARS, etc. and foreign research portals and similar institutions case analysis ICPSR were analyzed. Third, ScienceON’s user satisfaction and goal analysis were conducted. The satisfaction analysis analyzed 2021-2022 user satisfaction analysis and implications and previous studies on ScienceON demand and satisfaction analysis of MZ generation and college students conducted in 2022. Based on the current status analysis, case analysis, and satisfaction analysis, an attempt was made to propose ScienceON reorganization direction and identity definition, ScienceON branding, key term analysis and redefinition, menu system analysis and redefinition, and main page analysis and redefinition.

Step	Detailed research contents
Analysis of ScienceON's website operation status	- Analysis of website menu structure - Website function analysis - Analysis of term definitions within the website
+	+
Domestic and overseas similar service status and case analysis	- Case analysis of domestic research portals and similar institutions: NKIS, NTIS, PRISM, NARS, etc. - Case analysis of foreign research portals and similar institutions: ICPSR, etc.
+	+
Analysis of ScienceON's user satisfaction and goal	- 2021-2022 User Satisfaction Analysis and Implications - Analysis of ScienceON demand and satisfaction of MZ generation and college students based on previous studies - Derivation of implications based on analytical results
↓	↓
ScienceON reorganization and improvement plan	◇ Reorganization direction and identity definition - ScienceON branding
	◇ Key term analysis and redefinition - Comparative analysis of terms with similar functions of other institutions - Proposal to redefine terminology to improve scienceON accessibility, usability, and satisfaction
	◇ Menu system analysis and redefinition - Comparative analysis of similar menu systems of other institutions - Reorganization and redefinition of the menu system to improve ScienceON accessibility, usability, and satisfaction
	◇ Main page analysis and redefinition - Organization and redefinition of the main page to improve ScienceON accessibility, usability, and satisfaction - Proposal of icons that contribute to improving the accessibility of the main page
↓	↓
Conclusion and Recommendations	- Conclusion - Recommendations

Fig. 1. Research method for reorganization and improvement of ScienceON

4. Status of Similar Services Domestic and Abroad and the Results of Case Analysis

4.1 ScienceON operation status analytical results and the derivation of points of improvement

ScienceON is an intelligent research resource sharing and utilization platform that connects and converges science and technology information, research data, information analysis, and research infrastructure to support the entire R&D cycle. Researchers may be guided and provided with the knowledge infrastructure necessary for each stage of R&D, such as idea discovery, funding information identification, experimentation, task execution, sharing & collaboration, performance creation, and technology transfer. ScienceON provides such services with the goal of enhancing accessibility and usability, improving R&D efficiency, uninterrupted access, step-by-step research support, and high utilization of external resources. It also provides various contents such as information on researchers, researcher information, etc. However, it was identified that there were difficulties in the immediate access in terms of the terminologies that were difficult for the users, including the general public, to understand,

or in terms of menu configuration from a different perspective than other websites.

4.1.1 Improvement of the UI in line with the goal of enhancing accessibility and usability

As a result of the ScienceON analysis, too much information is presented on the first main page when accessing the website, and hence, the readability of the function is reduced, all functions are not visible within one page, and a lot of information is implemented at once, and hence, it was noted that it was difficult to understand the services in line with one's own purpose. Since information such as too many papers, patents, and reports is demonstrated at the bottom of the integrated search window, it would be necessary to delete the information provided within the main screen or implement a system that allows the users to open and close data. The service-related icons provided by ScienceON within the screen contain too much information such as service name, service description, service image, and color, making it difficult for the users to see the information. Hence, it would be necessary to improve the readability of the page by using simplified icons to provide only basic information.

4.1.2 Reinforcement of the service openness

It seems that there are problems with service openness and the need to strengthen openness. That is, one needs to log in to use the knowledge infrastructure such as industrial market size analysis, national researcher number, project information search, and national R&D excellence provided by Knowledge Infrastructure Search < Classification Search Service. This is a significant difference from the ScienceON operation goal, which emphasizes that all KISTI science and technology knowledge infrastructure may be utilized with a single login. Hence, login-based services are reduced, and all KISTI science and technology knowledge infrastructure except for personalized services such as MyON are reduced. Hence, it seems that it would be necessary to make use of the technological knowledge infrastructure.

4.1.3 Improvement of the menu structure and terminology for realizing the popularization of science and technology

The items on papers, patents, reports, trends, researchers, functions, and services within the ScienceON function are not structured and scattered. For example, in the case of issue reports, a shortcut service is provided under the name Issue Report on the main screen, but service is provided under the name of Beta Service ScienceON TREND on the menu tab, so the unification of basic names seems to be necessary. Hence, it is required that the reports provided under the two titles of Issue Report and ScienceON TREND must be unified under the name of ScienceON Trend. Furthermore, the reports for each trend topic, such as earthquake, small-scale production, generative artificial intelligence, autonomous driving, and nuclear fusion power generation, are used as issue reports, and it is recommended that the names of menus and provided services be unified.

Meanwhile, in the current menu, the services provided as analysis services and curation services are organized in the beta service menu, and data such as papers, patents, reports, and trends are

also serviced only through integrated search, for which it is recommended to classify according to the data type and service type. That is, to reconstruct the website into a UI that users can use easily and conveniently, it would be necessary to redefine terms that are not intuitively determined or amlargeuous.

4.1.4 Turning beta service into a regular service

Currently, the services that are provided by configuring the menu under the name of beta service at and by ScienceON are ScienceON Trend, Supercom Induced Results (thesis), EDISON Induced Results (thesis), Thesis Timeline, AI Thesis Summary, Thesis Q&A, Machine Learning Data utilization map and patent standard industry classification for the total of 8. In general, the beta service refers to a preview type of service that is released before the official service to check errors in the program and receive feedback from users before the official version of a program or game operated mainly on the Internet is released. However, in the case of the current AI thesis summary service, it has been serviced under the name of beta service for about 3 years and 7 months as of 2023, starting with a pilot launch in July 2020, so it seems to be the time to normalize the service and restructure the menu.

Furthermore, supercomputer induced performance, EDISON induced performance, thesis timeline, AI thesis summary, thesis Q&A, etc. must be classified as curation services or structured under the name of thesis large data analysis, etc., and the direction of redefining the menu must be considered, and in the case of ScienceON Trend (Issue Report), etc., it is a service which provides various curation services such as papers and trends that fit the topic in a single place, and hence, it seems necessary to improve in the direction of creating a top menu with a name such as ScienceON curation.

4.2 Results of the current status analysis for similar services in Korea and the derivation of points of improvement

In this study, ScienceON itself was analyzed as in the above, but also the cases of comprehensive portals providing similar services were also analyzed. In this study, cases were selected in consideration of the reorganization of the ScienceON's website and the improvement of user accessibility, usability, and satisfaction. The domestic cases include NTIS, NARS, PRISM, NKIS, National Medical Science Knowledge Center, and NST, and foreign cases include ICPSR, Figshare, Web of Science, and Statista. An in-depth analysis of the above contents has been conducted, and only the implications of such will be presented.

In deriving the implications based on domestic and foreign case analysis, the description is as follows with a focus on the contents worthy of benchmarking in terms of the use of ScienceON's names.

4.2.1 Use of intuitive names for the uploaded research results

First, it was identified that the names consistent with the service contents must be provided to facilitate the users' understanding and accessibility. In the case of similar information portal

sites, the names of the information provided by the sites are simple and the user-friendly UI is relatively simple and familiar. In the case of ScienceON, it is often difficult to know the functions just by looking at the titles such as knowledge infrastructure maps and scenarios, requiring improvement.

Second, in the case of well-known portal sites with high frequency of use, such as Web of Science and Statics, in most cases, the reports such as Documents, Reports, and Insight, statistics, and visualizations are provided to ensure that users can immediately know the names. To activate users of ScienceON and attract the new users, it would be necessary to benchmark famous portal service websites and improve the name with a simple and intuitive name.

Third, in the case of ScienceON, while it provides various large data-based analysis services, such as thesis summary service and scenario analysis service by subject, one step ahead of services of similar institutions, the name of the menu is not so clear, and hence, it is difficult to understand the function, and hence, it is understood as a lack of the function's identification.

4.2.2 Menu configuration according to the performance and information type

The menu configuration must be subdivided according to the type of information such as researcher information, research institution information, research and development performance information, data utilization information, project participation/management information, etc., and the upper menu must be composed accordingly. In the case of the National Assembly, it would be necessary to provide data and analytical data related to legislative investigation responses, legislative activity support, and publication of legislative and policy agenda reports, and provide services based on the name of the data. It is recommended to configure the upper menu by subdividing the menu according to the type of information such as researcher information, research institution information, research and development performance information, data utilization information, and project participation/management information.

4.2.3 Branding according to the characteristics of the institution in the case of providing bulletin boards and specialized information

In the case of NTIS, the free bulletin boards based on user participation such as science intervention and R&D example, and bulletin boards such as providing educational information are provided with names that reflect the characteristics of portals. Even in the case of ScienceON, it would be necessary to select a name after branding in the case of a free bulletin board where users directly participate, and a specialized service unique to ScienceON.

4.2.4 Provision of the information analysis with high demand for information reprocessing and easy user access

The up-to-dateness and usage rate of research, such as excellent research, recent research, and frequently viewed research, is provided separately, but in the case of frequently viewed research,

it is recommended to provide information to ensure that users can see at a glance the research that is currently in high demand.

Furthermore, research results such as popular data through the number of downloads and the latest data based on the latest release are reprocessed and provided. Providing content curation services with the most frequently used data on the same subject for research results, this data and this data, and the same occupational group, etc. There is a need to provide excellent video reports that convey the contents of various reports in an easy manner.

4.2.5 Additional provision of functions such as subject-categorized list and statistical service

Furthermore, it would be necessary to provide services based on subject-specific classification lists, provision search filters, and data collection subjects. In particular, as the most basic method of providing statistics and information, providing industry summary and related sub-industry keywords, providing service information such as recent statistics and popular statistics, periodically updating research results, statistics, issues, etc. with infographics, and vividly visualizing global stories would also be necessary to help visualize and provide current topics and trends, infographics, presentations, and research materials appropriate for the users.

Following which, it provides important citation information when using research data, such as citation-related analysis and citation criteria sorting, so it is also necessary to additionally introduce the citation information analysis within ScienceON.

5. Proposal of ScienceON's Improvement Plan

5.1 Proposal of ScienceON's branding

For the branding of ScienceON, first, the branding image and the reason why ScienceON operators and employees of the institution presented the brand name, etc. were analyzed, and about 30 names, including science on curation, science and technology information platform for R&D life cycle and collaboration support, science and technology information, curation service, science and technology R&D infrastructure curation service, gateway to successful research were proposed in variety of ways.

In this study, the basic concepts such as the meaning, role, and effect of website branding were used as a standard. That is, the meaning is that website branding is the design and production of a website to communicate and reinforce the brand identity of a company or organization, and its role plays an important role in recognizing the brand of an organization and providing information related to the brand to consumers. The effect is to 1) convey the value and philosophy of the company or organization through the contents, services, and products provided on the website, and increase the brand credibility through interaction with consumers, and 2) increase the brand awareness and brand trust and form positive relationships with the consumers.

Based on which, as a way to strengthen and expand the ScienceON branding, create and promote

differentiated content, improve content quality, utilize social media, collaborate and partner, develop new media channels, strengthen brand identity, establish active marketing strategies, community activities, and UX/UI improvements were proposed.

Furthermore, the ScienceON's brand selection criteria and direction were based on service sustainability, service inclusiveness, awareness of portal characteristics, user friendliness and intuitiveness.

As such, considering the meaning of branding, branding construction strategy, and ScienceON branding selection criteria, it is intended to propose the following brand names proposed by experts and ScienceON users and managers. That is, the 5 brand names are ScienceON, Ontong ScienceON, ScienceONPlatform, science information portal, ScienceON, science and technology information mecca, and ScienceON.

Table 1. Proposal for ScienceON's branding

Name of brand for final proposal	Reason for proposal
ScienceON	• ScienceON implants an image where science technology and scientists are landed, and the users feel familiar with the terms currently used.
Ontong ScienceON	• ScienceON implants an image where science technology and scientists are landed, and the users feel familiar with the terms currently used.
ScienceONPlatform	• A holistic platform that includes functions to comprehensively support science and technology-based research activities
Science information portal, ScienceON	• A scientific information portal where you can search and utilize all information related to science and technology at once
Mecca of science and technology information, ScienceON	• ScienceON, the mecca of science and technology information

5.2 Derivation of the problems related to ScienceON's key terms and the direction of improvement

An attempt was made to derive the problems related to the main terms provided by ScienceON and provide the directions for improvement. First, the reasons for the need to improve key terms are as follows.

5.2.1 Need for the improvement of key terms of ScienceON

According to the Guidelines on the Establishment and Operation of Websites for Administrative and Public Institutions (2023), one of the matters to be observed in creating and actualizing content is to use the terms as simple as possible to ensure that the customers can easily understand them. However, among the opinions of the ScienceON Qualitative Survey (FGI) Report (2020), there was an opinion that a term that could maintain the essence of 'knowledge infrastructure' must be used, and it turned out that the use of a term that could maintain the essence of the current service was absent. Hence, it would be necessary to propose a term that can maintain the essence of 'knowledge infrastructure.'

"…Knowledge infrastructure map is now such a familiar word to those who are growing up, so to those who are new to it, 'How do I search? Where must I go, or maybe something has to do with it? Which category do I fall under…" are told (ScienceON Qualitative Survey (FGI) Report, 2020).

Furthermore, there are opinions that the knowledge infrastructure map is a function that can navigate the site as a whole, and hence, it would be necessary to improve it to ensure that users may be familiar with it or the function may be intuitively approached.

"I thought it was a map and I thought I would be able to see the whole thing at a glance, but I didn't know what it was at first, and it was moving, so I clicked it and something came out again, so I have to find it here again…" (ScienceON Qualitative Survey (FGI) report , 2021).

As another example, when looking at classification search terms to see if it is a function that can systematically search, there is an opinion that other functions have appeared. Hence, it is necessary to improve the function of searching for science and technology knowledge infrastructure functions by information data type, research stage, and purpose of use of the tab in terms that can be well implemented.

"I clicked on itbecause I wanted to be able to systematically search for something with classification search, or it was a slightly different search service, but I didn't know what the next page was about…" (ScienceON Qualitative Survey (FGI) Report, 2021)

Furthermore, among the opinions of experts in the ScienceON Qualitative Survey (FGI) Report (2022), there was a response that UI improvement was needed for ScienceON at present, and among them, the opinion that intuitive naming of major services was needed appeared. Hence, it may be seen that the main service naming intuitiveness is required.

"I don't know what those menus above are about", "When I go into the menus, I can't even intuitively see what such menus are for…" (ScienceON Qualitative Survey (FGI) Report, 2022)

In the case of MyON's Creating Project, there was a feeling of being together by organizing a project, and there was an opinion that it was understood as a concept of sharing like a kind of sharing site such as organizing a community key, indicating that a name change was needed accordingly.

"…As soon as I entered, it says Project, so I didn't even know what this project was. What do you mean by creating a project, how can I create a project on a public site? That's what I thought.", "There is no concept of community. The concept of the users collaborating with someone on assignments and this concept entered, but because of the word My Project, that is also a bit confusing..." (ScienceON Qualitative Survey (FGI) Report, 2022)

Even when a case study was conducted on the similar institutions domestic and abroad, the service content and names of similar institutions were identical to promote the user convenience. In the case of similar information portal sites, the names of the information provided by the sites are simple and the user-friendly UI is relatively simple and familiar. For example, in the case of NTIS, information names such as researcher information, research institution information, R&D performance information, data utilization, etc., and service names for data analysis and utilization are intuitively presented. In this case, the legislative investigation request response and legislative activity support service are provided under the name of congressional activity support service.

Lastly, it would be necessary to organize service names such as trends and reports. In terms of service provision, such as trends and reports, the concept of distinguishing reports and trends is defined, but from the user's point of view, there is an opinion that the difference is amlargeuous. Hence, it would be necessary to organize the trend by integrating the trend within the report and presenting it in a sub-depth.

The need and purpose of major terminology improvement are summarized as follows.

Table 2. Need and purpose of improving ScienceON's key terms

Need for terminology improvement through current situation and case analysis ▶	Purpose of redefinition of terms based on the need for improvement
• Use as simple terms as possible so that users can easily understand	• Analysis of existing ScienceON function-based service terms (service names)
• Use the terms that can maintain the essence of the service	• Derivation of improvement direction based on case analysis of other portal services
• Intuitiveness required for main service naming	• Collection of opinions based on satisfaction results and the derivation of improvement plan
• Need to organize service names such as trends and reports	• Proposal for redefining terminology reflecting ScienceON's information service based on improvement plan

5.3 Redefining of the terms to help improve accessibility, usability, and satisfaction

To improve accessibility, usability, and satisfaction, it would be necessary to redefine current terms. Towards this end, it would be necessary to change the terminology of knowledge infrastructure search and to unify and organize the terminology.

5.3.1 Change of knowledge infrastructure search terms

There are the classification search and knowledge infrastructure map in the knowledge infrastructure search. First, in the case of classification search, it is defined as science and technology knowledge infrastructure function search by information data type, research stage, and purpose of use, which provides one with the services classified to be suitable for oneself as a function. Hence, the classification search needs to be changed to 1) classification search by the user's purpose and 2) information classification search (search) by data type.

Following which, it would be necessary to redefine the knowledge infrastructure map. It is a service to secure and connect information such as papers, patents, reports, and research data of academic societies, publishers, and information institutions around the world to ensure that researchers can utilize it anytime, anywhere as the relevant information is provided by the data type. As a result of analyzing the status of other institutions which provide similar functions, the public data portal names the data relationship map as a national data map, which allows easy search and search for location information and related relationships of openable data held by all institutions. Hence, since the knowledge infrastructure map functions to provide service functions provided by ScienceON by information data type, 1) ScienceON data map and 2) ScienceON information map, etc., are intended to be proposed.

5.3.2 Unification and organization of the terms

The terms expressed as ScienceON TREND and issue reports must be unified into ScienceON TREND. The icon that is currently expressed as an issue report on the main page must be expressed as ScienceON TREND, and it must be organized as an issue report on the latest science and technology trends and topics.

Furthermore, reports and trends must remain as they are, yet the contents must be reclassified. Reports must be reclassified into 1) analysis/policy/market reports, 2) national R&D research reports, and 3) science and technology policy issue analysis reports. The trends must be reclassified into 1) overseas science and technology trends, 2) Science Times (articles), 3) open access trends, and 4) science trends, and 5) research institution trends.

5.3.3 Intuitive redefinition of terminology such as utilization service

Scenario utilization service of utilization service and user utilization service must be redefined according to the purpose. First, the scenario utilization service is a function to help users use science and technology knowledge infrastructure by constructing a purpose-specific workflow between KISTI's infrastructure functions that are frequently used by the users. A workflow appropriate for the purpose is configured, such as data research, search for new tasks related to technologies of interest, and search for patents and applicants related to the industrial market. Hence, it would be necessary to redefine it with an intuitive name that can explain the function. Rather than the scenario utilization services, the names must be improved such as 1) workflow curation by the user's purpose, 2) curation by purpose of use, and 3) science and technology workflow curation.

The following are the user-utilized services. This function is a function that helps the users use science and technology knowledge infrastructure by classifying the KISTI's infrastructure functions that are frequently used by junior and small and medium sized business users into topics for each user's purpose to ensure that they can easily use them, providing them with useful information, etc. To redefine it with an intuitive name that can explain the function, it may be defined as a curation service for each user's purpose as a service that combines functions for employment, advancement, and project execution for the users by target. Hence, this study intends to propose 1) curation

by target of use, 2) utilization service by the user's purpose, and 3) curation service by the user's purpose.

Based on the above details of improvement, the problems and solutions related to ScienceON terms are presented as follows.

Table 3. Problems and solutions related to ScienceON terms

Classification	Pending issue	Improvements and solution plans
1	• Limitations in maintaining the essence of the knowledge infrastructure search menu	• **Classification search** ☑ 1) Classification search by user's purpose ☑ 2) Information classification search (search) by data type • **Knowledge Infrastructure Map** ☑ 1) ScienceON data map ☑ 2) ScienceON information map
2	• In the case of the ScienceON TREND menu, the main page guides one to the issue report.	• **'Issue Report' on the main page** ☑ Unification of term with ScienceON TREND
3	• Change of the term 'create a project' in MyON	• **'Creating Project' within MyON** ☑ 1) Sharing Project ☑ 2) Manage My Project
4	• Redefinition of scenario utilization service of utilization service and user utilization service in line with purpose	• **Scenario Utilization Service** ☑ 1) Customized classification service by purpose of use ☑ 2) Customized classification service ☑ 3) Science and technology workflow • **User Utilization Service** ☑ 1) Customized service for each target of use ☑ 2) Utilization service by user's purpose ☑ 3) Customized service by user's purpose

6. Direction of Improvement for ScienceON's Menu System

6.1 Need to redefine the ScienceON's menu system

Examining the menu configuration of similar cases, the menu configuration is subdivided according to the type of information such as researcher information, research institution information, research and development performance information, data utilization information, project participation/management information, etc., and is composed of upper menus. However, papers, patents, reports, trends, researchers, features, and services within the functions of ScienceON are all scattered and unstructured.

In the case of the National Assembly, it provides the data and analytical data on legislative inquiry, legislative activity support, and publication of legislative and policy agenda reports, and provides the services based on the name of the data. Hence, it would be necessary to improve the menu that lacks the user convenience.

According to the ScienceON Qualitative Survey (FGI) report, in the case of the menu UI, there

are some points that make it difficult for the users to check the service at a glance, such as the lack of service description and the fact that submenus are not demonstrated at a glance.

> "…I would like someone to explain to me what kind of service it is….," "…Generally, you can see all the sub-menus when you bring your mouse close to the menu, but with ScienceON, you have to click once. Even if you don't go to the sitemap, it would be nice if the menu appeared when you bring the mouse close to it..." (ScienceON Qualitative Survey (FGI) Report)

The services provided by configuring the menu under the name of beta service in ScienceON turned out to be a total of 8 services including ScienceON Trend, Supercom-induced performance (thesis), EDISON-induced result (thesis), thesis timeline, AI thesis summary, thesis Q&A, machine learning data utilization map, and patent standard industry classification. In the case of the AI thesis summary service, it has been serviced under the name of beta service for about 3 years and 7 months as of 2023, starting with a pilot launch in July 2020, and hence, it would be necessary to normalize the service and restructure the menu.

It is necessary to request the composition of the website menu referring to the UI of other sites. As a result of analyzing the qualitative survey report, it hopes to improve the website menu structure by referring to the menu structure of NTIS and KETEP.

> "…If you look at the website of NTIS, you can click the menu below the search bar to go directly to see what you want..." (ScienceON Qualitative Survey (FGI) Report)

It is necessary to improve the integrated search function to cover all information services such as information in the knowledge infrastructure map. According to the ScienceON Qualitative Survey (FGI) report, since the NTIS integrated search covers all menus provided by NTIS, it appears that it is hoped to reflect such, and hence, improvements will be needed.

> "The NTIS integrated search is a function that includes all of the menus below." (ScienceON Qualitative Survey (FGI) Report)

Lastly, the menu UI needs an improvement. In the ScienceON User Opinion NPS Survey Results Report (2020-2022), the evaluations of the site UI such as "The menu is detailed, yet it is difficult for first-time users to understand" and "I want the login method to be simple" were visible. However, when accessing the website, too much information is presented on the first main page, which makes it difficult to read the function, not all functions are visible within one page, and a lot of information is implemented at once, making it difficult to identify the service that suits one's purpose this has been revealed. Hence, it would be necessary to simplify the information in the main page or to provide a readable information.

Table 4. Need and purpose of improving ScienceON's key terms

Need for menu improvement through analysis of current status and case studies ▶	Purpose of redefining the menu system based on the need for improvement
• Menu composition based on material type and service type	• Analysis of existing ScienceON function-based service menus
• Need to improve the menu that lacks user convenience	• Derivation of improvement direction based on case analysis of other portal services
• Menu reorganization for regular service of beta service	• Collection of opinions based on satisfaction results and the derivation of improvement plans
• Demand for website menu configuration referring to UI of other sites	
• The integrated search function needs to be improved to cover all information services, such as information in the knowledge infrastructure map.	• Proposal for redefining terminology reflecting ScienceON's information service based on improvement measures
• Menu UI needs improvement	

6.2 Direction for the reorganization of the menu system

6.2.1 Improvement based on classification by the data type and service type

Under the current menu, the services provided as analysis services and curation services are organized in the beta service menu, and data such as papers, patents, reports, and trends are also serviced only through integrated search, and hence, each data type and service type must be classified for improvement.

ScienceON is provided such as integrated search, classification search (curation function), knowledge infrastructure map (data status analysis and visualization), scenario utilization service (curation function), user utilization service (curation function), MyON, ScienceON LAB (site use function) guide), ScienceON TREND (curation), supercom-induced performance and EDISON-induced performance (thesis information service), thesis timeline (provides a timeline visualized with a keyword map after analyzing the citation information of thesis), AI thesis summary (large data analysis), dissertation Q&A (a service that uses Q&A data to show the correct answer included in the body of the dissertation), machine learning data utilization map (data analysis), and patent standard industry classification. Furthermore, there are menus such as ABOUT which provide the website information.

Table 5. ScienceON's website menu specific functions and contents.

Sub menu	Type of service	Purpose
Integrated search	Search function	Search
Classification search	Curation by purpose and classification	Classification of information to review contents in line with purpose
Knowledge Infrastructure Map	Data status analysis and visualization	Website map classification
Scenario Utilization Service	Curation function	Information curation according to topic, purpose, etc.
User Utilization Service	Curation function	Entrepreneurship by target, project information source curation
MyON	Personal service	Personalization service (curation)
ScienceON LAB	Guide to using the site	Guide to site functions for users
Science ON TREND	Curation function	Issue Report by Topic
Supercomputer induced performance (thesis)	Big data analysis	Paper information service
EDISON induced performance (thesis)	Big data analysis	Paper information service
Paper timeline	Big data analysis & visualization	Timeline and visualization by period of the thesis
AI paper summary	Big data analysis	Summary service based on big data analysis
Paper Q&As	Big data analysis	Expected Q&A for each paper based on data analysis
Machine learning data utilization map	Big data analysis	Data analysis
Patent standard industry classification	Classification	Provision of patent standard industry classification
ABOUT	Introduction	Introduction of website

6.2.2 Restructuring of the beta service into the related upper menus such as curation and large data analysis

In the case of ScienceON Trend (Issue Report), etc., it is a service that classifies and distributes various information sources such as papers and trends that fit the subject, so it must be improved by creating a top menu under the name of a customized information service. Furthermore, it would be necessary to consider the direction of redefining the menu by categorizing supercom induced performance, EDISON induced performance, thesis timeline, AI thesis summary, thesis Q&A, etc. as a curation service or structured under the name of thesis large data analysis.

6.2.3 Other menu UI related solutions

Within the main screen, the service-related icons provided by ScienceON contain too much information such as service name, service description, service image, and color, making it difficult for the users to see the information. Hence, it would be necessary to improve the readability of the page by using simplified icons to provide only basic information.

Considering the characteristics of the MZ generation, UI and science design improvement is considered as the top priority improvement plan, and the characteristics of many portal sites and portal sites with high preference are benchmarked and reflected in promotion and design. Integrated search, detailed search, AI thesis search, and thesis timeline services with good existing evaluations are provided on the portal site as the main services, and additional services must also consider the characteristics and eye level of the MZ generation.

Hence, the existing menu system is redefined and presented as follows with a focus on the problems of the current portal and the contents proposed in the improvement and solution. Classification Search, Knowledge Infrastructure Map, Scenario Utilization Service, User Utilization Service, and Creating Project were intended to be presented together with the name change (proposal) proposed in the redefinition of term.

Table 6. ScienceON's website menu specific functions and contents.

Existing menu system		▶ Details of change	▶ Redefinition of menu system (proposed)		
Menu	Sub-sub menu		Menu	Sub menu	Sub-sub menu
Integrated search	Paper	▶ Addition of classification by integrated search search type	▶ Integrated search	Classification search by type	Paper
	Report				Report
	Patent				Patent
	Trends				Trends
	Researcher			Researcher/ institution search	Researcher
	Research institute				Research institute
	Function			Contents based search	Function
	Table/figure				Table/figure
	Research data				Research data
Exploration of knowledge infrastructure	Classification search	▶ Installation / movement of information classification menu	▶ Information classification	Classification search ① Classification search by user's purpose ② Information classification search (exploration) by data type	
	Knowledge Infrastructure Map	▶ Installation / movement of data map	▶	Patent standard industry classification	
Utilization service	Scenario Utilization Service	▶ Installation / movement of customized information service menu	▶ Customized information service	Scenario Utilization Service ① Customized classification service by purpose of use ② Custom sorting service ③ Science and technology workflow	
	User Utilization Service	▶ Installation / movement of customized information service menu	▶	User Utilization Service ① Customized service for each user ② Utilization service by user's purpose ③ Customized service for each user purpose ScienceON TREND	
MyON	Creating Project	▶ Maintain current system	▶ MyON	Creating Project 1) Maintain current status 2) Change of terminology ① Sharing Project ② Manage My Project	

Existing menu system		▶	Details of change	▶	Redefinition of menu system (proposed)	
Menu	Sub-sub menu				Menu	Sub menu / Sub-sub menu
ScienceON LAB		▶	Maintain current system	▶	ScienceON LAB	
About		▶	Maintain current system	▶	About	
Beta service	ScienceON TREND	▶	Installation / movement of customized information service menu	▶	Paper big data service	Supercomputer induced performance (thesis)
	Supercomputer induced performance (thesis)	▶	Installation of paper big data service menu	▶		EDISON induced performance (thesis)
	EDISON induced performance (thesis)	▶	Installation of paper big data service menu	▶		Paper timeline
	Paper timeline	▶	Installation of paper big data service menu	▶		AI paper summary
	AI paper summary	▶	Installation of paper big data service menu	▶		Paper Q&As
	Paper Q&As	▶	Installation of paper big data service menu	▶		
	Machine learning data utilization map	▶	Installation / movement of data map menu	▶	Data map	Machine learning data utilization map
	Patent standard industry classification	▶	Installation / movement of information classification menu	▶		Knowledge Infrastructure Map ① ScienceON data map ② ScienceON information map

7. Conclusion and Recommendations

ScienceON has the goal of enhancing the users' accessibility and utilization by guiding and providing various science and technology knowledge infrastructure in a single place, while offering the functions that allow the users to solve not only data-based information services but also large data-based analysis services in one-stop through KISTI. Notwithstanding which, this study was conducted base don the analytical result which claimed that, by improving the user accessibility, usability, and the satisfaction, the analytical results suggest that the expansion of influx of new users to ScienceON and improvement to improve the utilization of existing users are required (Younghee Noh and Dongho Wang, 2021; ScienceON in-house demand analytical result, 2023).

Towards this end, ScieneON analysis, analysis of about 20 domestic and foreign cases, ScieneON operator demand analysis, and user opinions were collected. Gathering which, a plan was presented by dividing it into the brand aspect, terminology aspect, and menu aspect.

First, it is a branding proposal and an identity strengthening plan. In this study, as a way to strengthen and expand the ScienceON branding, differentiated content creation and promotion, content quality improvement, social media utilization, collaboration and partnership, new media channel development, brand identity strengthening, active marketing strategy establishment, community activities, Suggested UX/UI improvements. Furthermore, the criteria and direction for selecting the ScienceON brand were the sustainability of the service, the comprehensiveness of the service, and

the user-friendliness and intuitiveness of the portal characteristics. Based on which, 5 brand names were finally proposed such as ScienceON, Ontong ScienceON, ScienceONPlatform, science information portal, ScienceON, science and technology information mecca, and ScienceON.

Following which, it is a proposal to redefine the key terms of ScienceON. In this study, from the viewpoint of improving accessibility, usability, and satisfaction, classification search is classified search by the user's purpose and information classification search (search) by data type. Knowledge infrastructure map is ScienceON data map and ScienceON information map, and scenario utilization service is customized classification service for each purpose of use, customized classification service, science and technology workflow, user utilization service is customized service for each use target, utilization service for each user's purpose, and customized service for each user's purpose, and Creating Project is project sharing and Manage My Project were proposed to be classified.

Furthermore, the direction for reorganizing the menu system was proposed, and it was proposed to improve classification by data type and service type, relocate beta services to related upper menus such as curation and large data analysis, and redefinition of the ScienceON's menu system by service and function was proposed.

Based on the results of this study, it is expected to be able to contribute to expanding the influx of new users to ScienceON and enhancing the utilization of existing users by improving user accessibility, usability, and satisfaction. However, another opinion that emerged from the previous studies or the collection of user opinions is that in the case of ScienceON, there is too much information delivered on the main page when first accessed, and that the information is not delivered effectively and might instead interfere with the overall aesthetic, as well as the service name and service description in the icon, service images, and colors included, thereby making it difficult for the users to review the information. Hence, in the future studies, additional opinions on the main page menu screen configuration or icons need to be conducted in terms of design and information provision, targeting the users.

References

Figshare. https://figshare.com/

ICPSR. https://www.icpsr.umich.edu/web/pages/

International Organization for Standardization 2011 ISO 25964-1:2011, information and documentation. Thesauri and interoperability with other vocabularies. Part 1: thesauri for information retrieval. Geneva. International Organization for Standardization.

International Organization for Standardization 2013 ISO 25964-2:2013, information and documentation. Thesauri and interoperability with other vocabularies. Part 2: interoperability with other vocabularies. Geneva. International Organization for Standardization.

National Assembly Library. https://www.nanet.go.kr/datasearch/webdb/selectforeAcademicDBList.do

National Assembly Research Service. https://www.nars.go.kr/index.do?sgrp=S01&APP=Web

National Library of Korea, Sejong-POINT. https://policy.nl.go.kr

National Science and Technology Standard Classification System.

https://www.nrf.re.kr/bis/doc/class/view?menu_no=322
NKIS. https://www.nkis.re.kr:4445/main.do
NTIS. https://www.ntis.go.kr/
The National Aeronautics and Space Administration. - For Educators.
https://www.nasa.gov/stem/foreducators/k-12/index.html

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