COUNTER5 Specification Analysis and Feature Analysis of Post-prints

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Abstract

[Purpose/Significance] In the context of continuously expanding digital resources and escalating financial investments, the critical role of usage effectiveness evaluation is becoming increasingly prominent. For over a decade, the COUNTER standard has remained committed to the research and refinement of statistical standards. [Method/Process] The fifth edition has now been released. Through comparison with the current fourth edition, this study summarizes its novel characteristics in terms of document format, resource types, element types, report attributes, and applicable scope, and provides a preliminary analysis. [Results/Conclusion] COUNTER Release 5 updates existing elements, introduces additional measurement dimensions, enhances flexibility for customized requirements, and achieves overall simplification and clarification of reports, thereby better safeguarding the standardized management and protection of interests of stakeholders in resource supply and demand. Early familiarization and study of the latest version will assist libraries in more effectively conducting resource procurement and evaluation activities.

Full Text

Analysis of the COUNTER Code of Practice: Release 5

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Abstract

[Purpose/Significance] As digital resources continue to expand and funding investments keep rising, the importance of usage benefit evaluation has become increasingly prominent. Over the past decade, the COUNTER Code

of Practice has remained committed to researching and refining statistical standards. [**Method/Process**] Release 5 is now available. By comparing it with the current Release 4, this article summarizes its new features in document formats, resource types, element types, report attributes, and applicable scope, and provides a preliminary analysis. [**Result/Conclusion**] COUNTER Release 5 updates existing elements, adds measurement dimensions, enhances flexibility for customized requirements, and achieves overall simplification and clarity of reports. It will better safeguard the standardized management and interest maintenance of all stakeholders in the resource supply chain. Early understanding and study of the latest version will help libraries better carry out resource procurement and evaluation work.

Keywords: COUNTER 5; electronic resources; usage statistics

1. Introduction

In today's ubiquitous knowledge environment, scientific research primarily relies on various digital resources that can be conveniently accessed, and university libraries increasingly emphasize digital resource development. According to the annual funding data published in the University Library Fact Database (2016-2017), the average annual investment in digital resources for Double First-Class universities has reached over ten million RMB, accounting for more than 65% of total literature resource expenditures on average [1]. Meanwhile, resource volumes continue to grow and coverage is expanding. Taking DRAA consortium procurement as an example, the number of foreign databases introduced increased from 98 to 138 between 2010 and 2017, while participating institutions submitting procurement receipts and satisfaction surveys rose from 206 to 306 [2]. As purchasers, libraries need to effectively evaluate procured resources and measure return on investment to ensure optimal allocation and efficient use of library funds. Usage statistics are undoubtedly the most direct and effective method. The demand for resource statistics and evaluation has gradually evolved from simply providing COUNTER-compliant statistical data to delivering multi-dimensional usage reports.

Different database vendors have heterogeneous underlying database structures, resulting in non-standardized statistical data formats that make it difficult for libraries to conduct horizontal comparisons and effectively evaluate usage benefits across different resources. This necessitates research and development of feasible methods acceptable to both database vendors and libraries at the level of statistical standards and implementation operations [3]. The release of the COUNTER Code of Practice represents an innovative solution for digital resource usage statistics based on underlying technical specifications. Over the years, COUNTER has become a widely adopted standard for digital resource usage statistics among foreign vendors and plays an important role in evaluating the procurement performance of digital resources in libraries both domestically

and internationally. COUNTER Release 5 was officially published in July 2017 and became effective in January 2019. This article provides a detailed interpretation of this latest version to offer valuable references for future digital resource development and evaluation work.

2. Development History and Research Progress

COUNTER was initially known as "Project COUNTER" and originated in the United Kingdom. Between 2000-2001, Richard Gedye from Oxford University Press led the project team in establishing a normative framework and implementation promotion process. To provide a long-term stable foundation for this work, the project team registered as a non-profit organization, COUNTER Online Metrics, in August 2003 in the UK, and released the *COUNTER Code of Practice for Journals and Databases (Release 1)* (COUNTER R1) in December 2002, which gained widespread application within a short period [4]. In April 2005, after a one-year trial period, the *COUNTER Code of Practice for Journals and Databases (Release 2)* (COUNTER R2) was officially released. In response to library demands for e-book usage statistics, the team released the *COUNTER Code of Practice for Books and Reference Works (Release 1)* (COUNTER B1) in March 2006. In April 2012, the *COUNTER Code of Practice for e-Resources (Release 4)* (COUNTER R4) was promulgated [5]. This version represented an upgrade and integration of the previous *COUNTER Code of Practice for Online Journals and Databases* and COUNTER B1, and remains in use today. The *COUNTER Code of Practice for e-Resources (Release 5)* (COUNTER R5) is now available online and for download, and officially came into use in January 2019. Figure 1 [Figure 1: see original paper] illustrates the development history of COUNTER.

Corresponding to COUNTER' s practical development, scholars at home and abroad have conducted extensive research on electronic resource measurement and evaluation.

Early research covered various aspects of COUNTER standards, data protocols, and report types. Guo Yiqun introduced the origins, core content, and development trends of COUNTER R2 [7]. Zhu Bing and Li Chunming compared the statistical functions of different electronic resource systems in relation to the National Library' s subscription situation [8]. K. Fischer documented a Cornell University librarian' s report on how e-journal interfaces affect usage statistics and their implications for publishers, libraries, and Project COUNTER, discussing solutions including standardized user interfaces, creation of flexible and comparable statistical elements, and improved COUNTER metrics [9]. Regarding COUNTER B1, Liu Tingrong and Yan Xia detailed its statistical content, terminology definitions, data processing, report formats, and submission procedures [10]. Suo Chuanjun reviewed foreign research on online usage statistics for electronic resources, noting that data standardization and accessibility

are key focuses in the field, while methods for obtaining in-depth data and developing data management tools are research challenges [11]. Foreign scholars also introduced two consortium reports based on COUNTER standards: "Consortium-wide usage statistics for online book and journal full-text usage" and "Consortium-wide usage statistics for searches by database," discussing how COUNTER and the SHIH protocol facilitate big data processing [12].

Recent research has primarily focused on Release 4, the longest-used current version. Dong Yue et al. analyzed COUNTER 4 book usage statistics features, explored standard failures, demonstrated libraries' disadvantaged position in the changing supply-demand relationship, and emphasized the necessity for libraries to actively engage in reform and innovation [13]. Li Hong compared and analyzed the new features of COUNTER 4 relative to its predecessor [6]. Chen Daqing overviewed five types of standards related to electronic resource management, studied the correspondence between ERM data elements and electronic resource management standards, and proposed establishing dynamic standard maintenance mechanisms and implementation methods [14]. Li Xueting et al., based on 360Counter statistics from Harbin Institute of Technology Library, analyzed IEL database usage in terms of cost and literature demand to explore scientific and rational methods for building electronic resources and optimizing library resource structures to improve information service quality [15]. Zhang Jilong et al., using Fudan University Library as a case study, analyzed COUNTER standard implementation issues and provided empirical evidence and improvement recommendations [3]. Foreign scholars A. Osterman et al. introduced Usus, a community website based on COUNTER standards designed to provide discussion space for librarians, consortia, publishers, aggregators, repository managers, and scholars [16]. O. Pesch studied the COUNTER R5 immediately upon its release, comparing improvements relative to COUNTER R4 and discussing implications for librarians [17].

As can be seen, domestic and international academic research combines theory and practice, with scholars maintaining high attention to COUNTER, demonstrating the importance of this research topic and the industry' s emphasis on it. However, no domestic papers analyzing COUNTER R5 have been published yet. This article introduces the new version by comparing it with Release 4 from perspectives including document formats, resource types, element types, report attributes, and applicable scope, and analyzes its features in combination with library resource procurement and management practice to provide references for domestic libraries to better utilize the standard in resource procurement and evaluation.

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3. Overview of COUNTER 5

COUNTER Release 5 spans 166 pages—more than six times the length of the current Release 4—and includes 14 formal chapters: Introduction, Overview,

Technical Specifications, COUNTER Reports, Delivery of COUNTER Reports, Usage Logs, Processing Rules for Underlying Data, SUSHI, Testing and Auditing, Other Compliance Topics, Extended Code of Practice, Ongoing Maintenance, Transition Between Versions, and Revision History, plus four appendices. Compared with COUNTER R4, the new version has a richer and more comprehensive structure with clearer classification of resource types, element attributes, and usage reports. For example, resource types have gradually expanded from early "journals" to "books" and "multimedia," and further to research data and social media, as shown in Table 1 .

Table 1. COUNTER 5 Resource Types and Content Descriptions

Resource Type	Description
eJournal	Online serial publications
eBook	Online published monographs
eBook Collection	Collections of online monographs with common themes (e.g., engineering eBook collections)
Multimedia	Audio, video, and other multimedia content
*Multimedia Collection	Collections of audio, video, and other multimedia content integrated and sold by specific themes
*Aggregated Full Content	Contains full-text articles and possibly non-text content as independent/predefined data sets
*A&I Database	Non-full-text databases, typically containing article metadata, abstracts, and subject classifications to help researchers locate relevant literature
*Discovery Service	Provides broad searching from a single search interface, with direct access to hosted content or linked access to other sites' content
*Data Repository	Stores institutional research data
*Repository	Stores research outputs
*Scholarly Collaboration Network	Academic information services shared among researchers

Note: Asterisked items are new resource types.

4. COUNTER 5 Elements

Elements are the focal points for forming measurement reports in COUNTER. The COUNTER Code of Practice involves a wide range of elements. Different reports contain different elements, and different elements apply to different reports. Based on content description, elements can be further categorized.

4.1 Elements Describing Resource Attributes In COUNTER 5, elements describing resource attributes include Parent Item and Component Item, which contain 11 secondary elements such as title, author, publication date, data type, and ISBN (see Figure 2 [Figure 2: see original paper]). Three updated items are selected for detailed introduction below.

4.1.1 Publication Date

COUNTER 4 only provided usage statistics by Year of Publication (YOP) for journal resources (Journal Report 5). COUNTER 5 expands its applicability to all reports and all resource types. This element is identified by four digits: when the electronic version' s publication year differs from the print version, the electronic record' s publication year prevails; if the publication year is unknown, it is marked as "0001" ; for newspaper articles (not yet published), it is marked as "9999."

This expanded applicability will play a positive role in actual library resource development work. For already subscribed resources, using this element combined with usage data helps libraries grasp the literature half-life of disciplines. For resources not yet subscribed, using this element combined with turnaway data enables precise positioning of resources by copyright year, especially for backfile needs, helping libraries find balance points among demand, resources, and funding to maximize benefits. Literature half-life varies by discipline—science and engineering have shorter cycles than humanities and social sciences. For example, computer science has significantly higher update frequency than other disciplines, requiring shorter academic circulation cycles. Unlike conventional journal publications, academic research and innovation in computer science are more often presented timely through conference proceedings. Therefore, university libraries should develop resource guarantees and services based on their institutional disciplinary characteristics.

4.1.2 Data Type

COUNTER 5 explicitly introduces the concept of Data Type. In addition to the original platform, database, journal, book, and multimedia, five new data types have been added: Dataset, Book Segment, Dissertation or Thesis, Newspaper or Newsletter, and Repository Item. This element keeps pace with the growing diversity of resources and expands existing data types.

Different resource types have unique attributes and deserve their own measurement standards. Taking PQDT as an example—it is currently the only database in China providing full-text foreign dissertations, having collected over 700,000 excellent doctoral and master' s theses from more than 2,000 renowned uni-

versities in Europe and America, serving as crucial information resources for academic research with over 250 domestic users. As a data resource with massive content and a broad user base, under current standards it can only reference existing journal and book resources for measurement, providing simple search, browse, and download counts. The new standard will enable dissertations to have independent measurement standards, using individual papers as measurement units while providing four types of master reports to assist libraries in further mining and analyzing user behavior and needs for this resource type.

4.1.3 Digital Object Identifier (DOI)

The COUNTER Code of Practice aims to accurately locate referenced objects through identifiers for more precise resource management and measurement. For example, to match usage statistics with local electronic resources, COUNTER R4 added Journal DOI and Book DOI. Correspondingly, Institutional Identifiers help resource suppliers recognize usage reports from various institutions. Building on this, COUNTER R5 introduces Publisher ID, providing a standardized unique identifier for suppliers and completing this conceptual system.

This addition will greatly facilitate library literature guarantee work. Using the University of Electronic Science and Technology of China (UESTC) Library' s evaluation of ESI top 1% discipline resources as an example: in 2017, the library' s subject service evaluated ESI Biology & Biochemistry journal resources (see Table 3) to grasp disciplinary resource guarantee status and generate purchase recommendations based on turnaways to guide supplementation of high-quality disciplinary journals, thereby supporting "Double First-Class" construction from the perspective of literature resource guarantee. In May 2018, UESTC's "Biology & Biochemistry" discipline entered the ESI top 1% for the first time, becoming the university' s seventh discipline in this category, marking significant achievements in the university' s discipline enhancement strategy [18]. Since current standards only provide classified statistics for Gold OA journal resources, this evaluation required manual screening of access types. The new standard not only expands applicable resource types to e-books, multimedia, and repositories but also incorporates Delayed OA into access type statistics. This means libraries can more quickly grasp the distribution of resource access types, substantially reducing resource evaluation workload, especially the human and time costs invested in underlying data cleaning, thereby optimizing resource development benefits.

4.2 Elements Describing Measurement Dimensions To adapt to changes in online resource nature and access methods, COUNTER 5 enriches measurement dimensions by expanding and introducing new elements to help managers easily conduct higher-level summarization or lower-level expansion, thereby increasing report flexibility, reducing the number of subject-specific reports, and achieving overall simplification and clarity.

Updated elements in COUNTER 5 describing measurement dimensions include Access Type, Metric Type, and Access Method.

4.2.1 Access Type

Library resource budgets continue to increase, and the demand for more targeted metrics and attributes for cost-effectiveness evaluation has grown. With the popularization of intellectual property rights and information openness, library procurement inevitably involves open access resources, which are subdivided based on timing and scope of openness. COUNTER 5 adds "Delayed Open Access (OA Delayed)" to Release 4' s "Gold Open Access (OA Gold)," expanding Access Type to track usage of licensed resources, open access resources, and other freely available content (see Table 2).

Table 2. COUNTER 5 Access Types

Access Type	Description	Applicable Resources	Applicable Reports
Controlled	Content item is not publicly available at time of request (e.g., before payment); access rights limited to authorized users. Trial/subscription access considered "controlled."	eBooks, eJournals, Multimedia	TR, IR, TR_{J1}

Access Type	Description	Applicable Resources	Applicable Reports
Gold OA	Content item accessible under Gold OA license at time of request (immediately and permanently accessible due to APC or funding). May be hybrid or fully OA. Note: During embargo, classify as "controlled."	eBooks, eJournals, Multimedia	TR, IR, TR_{J1}
*Delayed OA	Content item accessible after embargo period expires. Author-archived works in institutional repositories with public access restricted during embargo. Requires COUNTER approval and implementation schedule.	eBooks, eJournals, Multimedia	TR, IR, TR_{J1}

Access Type	Description	Applicable Resources	Applicable Reports
Other Free to Read	Freely accessible during transaction (no license required) and not fitting any OA type. Note: Only for institutional repositories.	Repository	IR

Note: Asterisked items are new access types.

Usage statistics for this portion of resources will serve as a reference for library budget planning, while literature resource development will positively impact university discipline development.

4.2.2 Metric Type

Inconsistent measurement standards prevent horizontal comparison of similar resources. For example, COUNTER 4 for e-books had two standards: Title Requests (batch downloads) and Section Requests (chapter downloads), but publishers chose different standards based on their needs, preventing libraries from making effective comparisons among purchased resources or scientifically judging funding utilization benefits. COUNTER 5 makes new definitions in this regard.

First, it defines user activities as "Requests" versus "Investigations." The former refers to user browsing or downloading of actual full-text content, while the latter defines all types of user activities including requests. Figure 3 [Figure 3: see original paper] illustrates their relationship.

Second, it defines measurement units as Total Item, Unique Item, and Unique Title. Table 4 provides examples using e-book chapter access in a single user session.

Table 4. COUNTER 5 Metrics and Descriptions

Metric	Description	Changes from COUNTER 4
Total Item Investigations	Records all access activities for book chapters (cumulative for repeated access). Replaces Result Clicks and Record Views.	Updated
Total Item Requests	Records all request activities for book chapters (cumulative for repeated requests). Maintains original standard with updated description.	Updated
Unique Item Investigations	Records non-duplicative access activities for book chapters (non-cumulative for repeated access).	New
Unique Item Requests	Records non-duplicative request activities for book chapters (non-cumulative). If user accesses both HTML and PDF versions, counts as "1." Useful for UI transparency.	New
Unique Title Investigations	Records non-duplicative access activities for book titles (non-cumulative for repeated access). Provides horizontally comparable e-book usage data.	New

Metric	Description	Changes from COUNTER 4
Unique Title Requests	Records non-duplicative request activities for book titles (non-cumulative). Provides horizontally comparable e-book usage data.	New

In practice, libraries can select different metric types based on specific needs. Total Investigations/Requests show user attention and popularity for procurement projects. Unique Title Investigations/Requests provide per-title usage for horizontal comparison, helping libraries calculate unit utilization rates and costs for budget planning. As research libraries needing to mine user behavior and interpret needs deeply, Unique Item Investigations/Requests refine user needs to the item level, increasing data value depth. With this element, libraries can extract more influential secondary units from single-title resources, identify disciplinary research focuses, add dimensions to subject services from resource evaluation perspectives, and integrate with reading promotion to prepare materials for intensive reading and promote academic dissemination, thereby advancing overall discipline construction.

4.2.3 Access Method

Usage purpose often determines resource access method. Understanding user access methods is crucial for publishers, procurers, and administrators. For turnaways, causes vary: high turnaway volume may indicate need for purchase, while low volume may suggest fulfilling scattered needs through interlibrary loan. Turnaways may also result from excessive access, requiring libraries to confirm causes—whether current concurrent user limits cannot meet demand or improper user behavior causes excessive downloading.

COUNTER 5 introduces Access Method to track user acquisition behavior and determine usage data purpose. Its value "Regular" represents typical user activities on platforms or content hosts. "TDM" represents text data mining through specific APIs, primarily for e-journals and books. Analyzing user behavior and purpose helps libraries sort various situations and formulate/improve resource development and management strategies.

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5. COUNTER 5 Reports

As the practical manifestation of measurement, reports constitute the main content of the COUNTER Code of Practice. COUNTER 4 provided a relatively complex classification with 27 statistical reports. COUNTER 5 consolidates

these into 4 categories with 14 reports, with measurement time granularity down to monthly (see Table 5).

Table 5. COUNTER 5 Reports and Descriptions

Report Name	Content	Changes from COUNTER 4
Platform Master Report (PR)	Platform access activities	New (customizable). Merges original Book Report 4 (turnaways). Adjusts original Platform Report 1 to: Regular Searches Total Item Requests Unique Item Requests Unique Title Requests
Platform Usage (PR_{P1})	Platform usage	New (customizable)
Database Master Report (DR)	Database/collection access activities	Adjusts original Database Report 1 to: Searches: a) Regular b) Federated c) Automated Total Item Investigations Total Item Requests
Database Search and Item Usage (DR_{D1})	Database/collection usage	New (customizable)
Database Access Denied (DR_{D2})	Database/collection turnaways	Maintains original Database Report 2 standard with updated language: "No License" and "Limit_{Exceeded}"
Title Master Report (TR)	Title-level access activities	New (customizable). Merges 5 original reports (Title Reports 1-3, Journal Reports 1GOA and 3)
Book Requests (TR_{B1})	Non-Gold OA book usage	Changes original Book Report 1 to Unique Title Requests Changes Book Report 2 to Total Item Requests Deletes Book Report 5
Book Access Denied (TR_{B2})	Book turnaways	Maintains original Book Report 3 standard with updated language
Book Usage by Access Type (TR_{B3})	Book usage by access type	New: Access types: Controlled, Gold OA Metric types: Total/Unique Item and Unique Title Investigations/Requests
Journal Requests (TR_{J1})	Non-Gold OA journal usage	Changes Journal Report 1 to Total Item Requests (all activities) and Unique Item Requests (for cost evaluation) Deletes Journal Report 4
Journal Access Denied (TR_{J2})	Journal turnaways	Maintains original Journal Report 2 standard with updated language
Journal Usage by Access Type (TR_{J3})	Journal usage by access type	New: Access types: Controlled, Gold OA Metric types: Total/Unique Item Investigations/Requests

Report Name	Content	Changes from COUNTER 4
Journal Requests by YOP (TR_{J4})	Journal usage by publication year	Merges original Journal Report 5 (annual) and Journal Report 1a (backfiles)
Item Master Report (IR)	Item-level access activities	New (customizable)
Journal Article Requests (IR_{A1})	Journal article requests	New: Provides Total Item Requests for data type "journal," section type "article"
Multimedia Item Requests (IR_{M1})	Multimedia item requests	Replaces original Multimedia Report 2

The four report categories are: 1) **Platform Reports** provide summaries of platform-based access activities to support evaluation, including master and usage reports (identifier: PR). 2) **Database Reports** provide activities related to databases or collections for evaluating institutional database usage, including master, usage, and turnaway reports (identifier: DR). 3) **Title Reports** provide usage evaluation for given series (e.g., journals, magazines, newspapers) or monographs (e.g., books, e-books, textbooks, reference works) (identifier: TR). 4) **Item Reports** show more granular access activities (identifier: IR). Master reports in each category allow librarians to customize reports for personalized needs.

The adjustment principle of COUNTER 5 is to categorize and merge COUNTER 4 reports, with one exception: the generic "Searches" in original Platform Report 1 and Database Report 1 have been split: 1) Original "Regular Searches" is divided into "Searches_{Regular}" (database-based) and "Searches_{Platform}" (platform-based). 2) Original "Searches_{federated} and automated" is divided into "Searches_{Automated}" and "Searches_{Federated}," applicable only to database reports.

Notably, COUNTER 5 also deletes two categories of reports from COUNTER 4: 1) **Mobile-based reports**—with increasing mobile device varieties and screen resolutions surpassing desktops, webpage design and usage harvesting no longer require separate mobile device distinction. Three reports are deleted: Journal Report 3 Mobile, Title Report 1 Mobile, and Title Report 3 Mobile. 2) **Library consortium reports**—current technology supports SUSHI automatically harvesting and integrating member data to generate consortium-wide totals, eliminating the need for administrators to collect and integrate individual member reports. Three reports are deleted: Consortium Report 1 (three variants).

6. Conclusion

Over the decade since COUNTER's release, evolving technological environments, increasingly rich resource forms and content, rising library literature expenditures, and growing emphasis on resource cost-effectiveness and academic benefits have driven continuous updates and improvements to the COUNTER Code of Practice. COUNTER remains committed to providing practical operational guidelines, balancing changing measurement needs through open international standards and protocols to provide a reference framework for recording, exchanging, and processing online usage data for various electronic resources. The new version will inject new vitality into usage measurement and create favorable conditions for optimizing resource allocation. Its release and application merit attention and anticipation from relevant practitioners.

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