



中南大学
CENTRAL SOUTH UNIVERSITY

图书馆
LIBRARY

数智赋能高校图书馆数字学术服务 平台化路径探析

汇报人：苏志芳、周芬、唐睿
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PART ONE

1

研究背景和现状



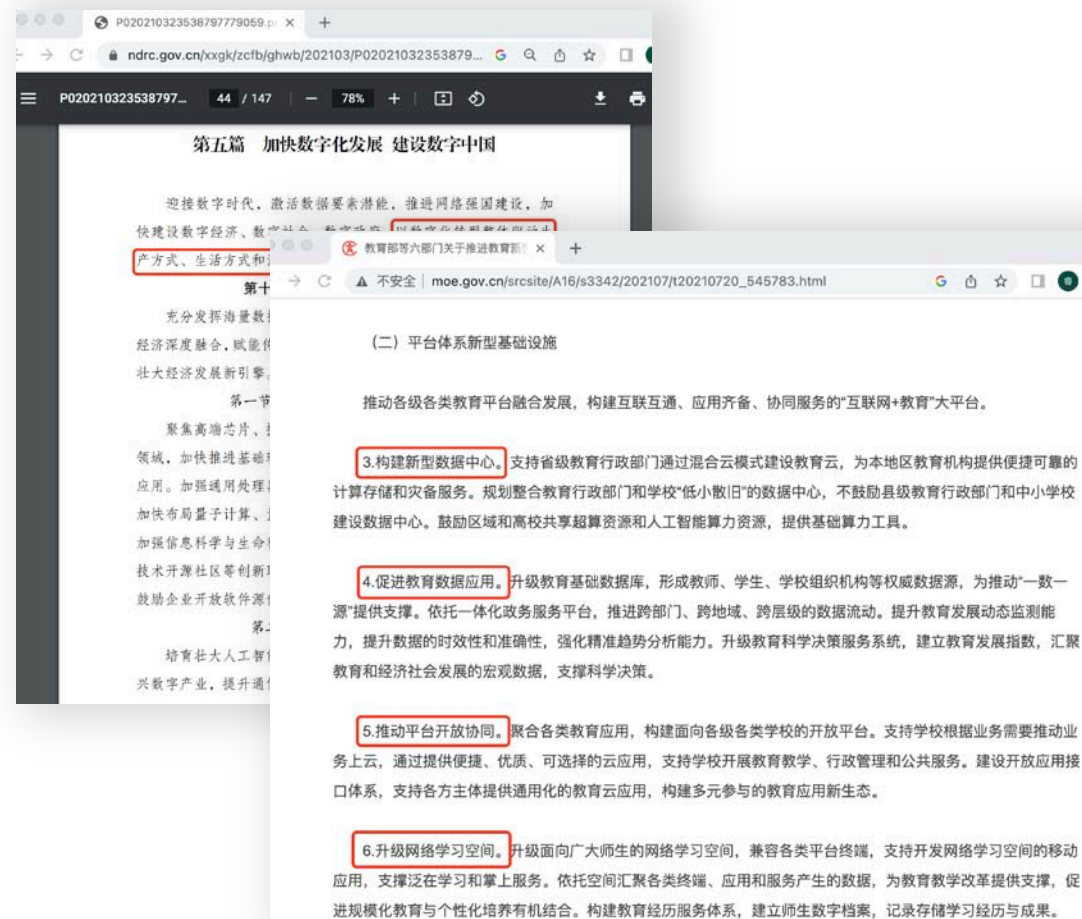
1.1 研究背景



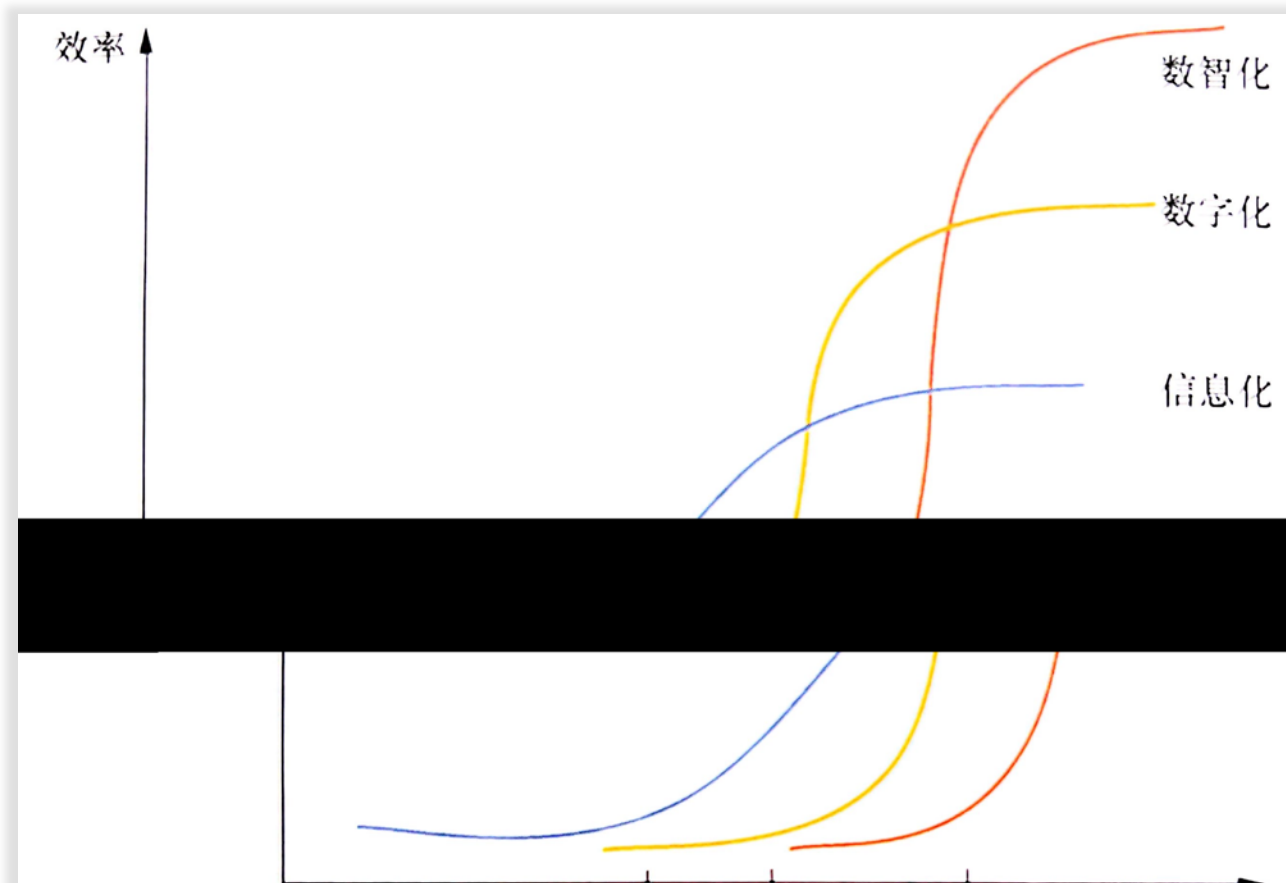
政策背景

2021年3月，《中华人民共和国国民经济和社会发展第十四个五年规划和2035年远景目标纲要》提出“**加快数字化发展建设数字中国**”。

2021年7月，《关于推进教育新型基础设施建设构建高质量教育支撑体系的指导意见》提出“**推动各级各类教育平台融合发展**”。



1.1 研究背景



技术背景

“**数智化**就是“数字化 + 智能化”，它以计算、连接、协同、数据、智能为核心能力要素



1.2 研究意义



- 构建系统的学术服务平台架构对数字学术的**现有理论研究进行补充和完善**，弥补该方向理论研究的欠缺。
- 数字学术服务平台为学校师生提供数字学术交流和科学研究所需的工具设施以及服务，并对科研全过程活动产生的数据进行保存、管理与分析，**促进科研成果转换，助力学术创新**。
- 数字学术服务平台探索读者需求驱动和数智技术驱动的**大学图书馆智慧服务新模式**，**为图书馆的发展创新、转型与变革提供新的机会**。



1.3 概念



数字学术服务是图书馆针对多学科科研人员进行跨学科合作的需求，充分运用新兴信息技术，通过组织、标引、挖掘和利用各类资源，深入科学研究生命周期各个环节开展的全方位学术服务。（ACRL）



本研究认为，数字学术服务主要是图书馆面向数字学术生命周期全流程，利用数字资源、新兴技术和工具等，为科研人员提供嵌入数字项目各阶段的项目管理、数据分析、数据保存、出版和交流等相关服务。



1.4 研究现状——述评



国内外研究重点有所不同，国外学者主要研究数字学术项目和参与人员的合作关系，国内学者着重探讨数字学术服务多元内容和空间建设。美国学校图书馆在数字学术服务方面走在了世界前列。



虽有提及数字学术平台建设的重要性和数字学术服务的实践案例，但还没有对高校图书馆数字学术平台建设情况调研，也缺少平台实现路径和整体架构的详细阐述。



PART TWO

2

数字学术服务平台调研



2.1 调研对象



- **样本选择：**

对2023年美国U.S.NEWS世界大学排名前30所高校的图书馆网站进行调研，访问数字学术服务平台的相关页面，最终获得包含普林斯顿大学、哈佛大学、康奈尔大学等13所大学为有效样本。

2.1 调研对象



编号	学校	平台名称
#1	普林斯顿大学	数字人文中心 (Center for Digital Humanities)
#2	哈佛大学	数字学术支持小组 (Digital Scholarship Support Group)
#3	芝加哥大学	数字学术中心 (Center for Digital Scholarship)
#4	约翰霍普金斯大学	数字研究和管理中心 (Digital Research and Curation Center)
#5	宾夕法尼亚大学	研究数据和数字学术 (Research Data & Digital Scholarship)
#6	布朗大学	数字学术中心 (Center for Digital Scholarship)
#7	范德堡大学	数字学术和交流办公室 (Digital Scholarship and Communications)
#8	美国莱斯大学	数字学术服务 (Digital Scholarship Service)
#9	康奈尔大学	数字学术服务 (Digital Scholarship Service)
#10	哥伦比亚大学	数字学术 (Digital Scholarship)
#11	埃默里大学	埃默里数字学术中心 (Emory Center for Digital Scholarship)
#12	乔治城大学	数字学术服务部 (Digital Scholarship Services Unit)
#13	纽约大学	数字学术服务 (Digital Scholarship Service)

2.2 调研内容



数字学术服务平台调研维度



数字基础设施



AI技术



服务内容

2.2 调研内容——数字基础设施



美国各高校构建了供通信、协作和计算，支持数字学术的专有工具资源集聚的数字基础设施。



数据中心和
超算设施



软件、服务、
平台和各种
工具



通讯网络
设施

哈佛大学数字基础设施包括：



Omeka

用于共享数字馆藏和创建富媒体内容的在线展览平台



Scalar

学术论文撰写和发布平台



数字工具包

预装了各类软件的远程桌面环境

Harvard University Digital Scholarship

HOME INITIATIVES EVENTS NEWS ABOUT THE DSSG CONTACT

omeka

projects, particularly in history.

In Fall 2015, the History Department began hosting courses Omeka sites on a trial basis. As demand for the service grew beyond the department, Academic Technology for FAS began development of an FAS-wide service to host Omeka for course work. This service takes advantage of the scalability of Amazon Web Services to enable support for a much larger number of sites, and allows requests to be made through a simple form.

Omeka Plugin Development

In addition to supporting a standard installation of Omeka for FAS courses, Academic Technology for the FAS, DARTH, and the History Department have collaborated on a number of Omeka plugins to extend Omeka functionality, making it easier to use the platform in a classroom setting.

HarvardKey Integration

When the service first launched, Omeka users had to maintain separate login information for each site. With the integration of HarvardKey credentials, students, staff, and faculty can all use their HarvardKey credentials to log in to Omeka sites. This plugin also allows users to be added in bulk, simply by copying a list of emails into the plugin configuration. This plugin has greatly simplified the use of Omeka in a classroom setting.

Elasticsearch

For larger Omeka collections, it can be beneficial to have a faster, more robust search engine. The Omeka Elasticsearch plugin not only allows users to search through the contents of their Omeka sites more easily, but also gives them all of the features that Elasticsearch has to offer, including advanced facets and filters through a simple search syntax.

Course Tools

This plugin allows instructors to manage the permissions of their students dynamically throughout the term, enabling and disabling various editing and viewing permissions.

Digital Toolkit

When introducing students to new software, especially open source software, it can be time-consuming to deal with the variety of operating systems and environments that students can bring to the classroom. To address this issue, Academic Technology for FAS developed a remote desktop environment with a variety of software pre-installed, so that students can use software for digital scholarship without a cumbersome setup process. Remote environments are slower than working with software on your own machine, so students will still want to install software that they intend to use on their own computers, but this tool alleviates what can be a quite painful setup process.

Harvard University Digital Scholarship

HOME INITIATIVES EVENTS NEWS ABOUT THE DSSG CONTACT

Infrastructure Development Initiatives

The DSSG's support infrastructure works across domains and units within the University, allowing it to provide newly-available resources to faculty and graduate students who are interested in using digital methods and tools. Some of these are supported directly by the group, while others are maintained by our partners around Harvard. They include the following:

Scalar as a Service

Interactive media form the cornerstone of the modern web. **Scalar** is a free, open-source authoring and publishing platform that's designed to make it easy for authors to write long-form, born-digital scholarship online. Scalar enables users to assemble media from multiple sources and juxtapose them with their own writing in a variety of ways, with minimal technical expertise required, while also supporting collaborative authoring and reader commentary.

Harvard's Scalar pilot (<https://scalar.fas.harvard.edu/>) is managed by Academic Technology for FAS and Arts and Humanities Research Computing, and has been used heavily in DSSG workshops. To get started with Scalar, fill out this request form for access, or contact atg@fas.harvard.edu. If you are using Scalar for a class, you can contact atg@fas.harvard.edu and request that we load your roster in to the Scalar site.

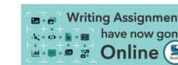
Custom Harvard ScalaraaS features include:

- HarvardKey integration
- Canvas course import
- IIF manifest support with Mirador 3
- Harvard Art Museum API search and import

Omeka Hosting as a Service

Omeka is a content management system oriented towards libraries, archives, and museums. Its focus is on granular items, which are used to weave together broader narratives. This focus makes it useful for many academic projects, particularly in history.

In Fall 2015, the History Department began hosting courses Omeka sites on a trial basis. As demand for the service grew beyond the department, Academic Technology for FAS began development of an FAS-wide service to host Omeka for course work. This service takes advantage of the scalability of Amazon Web Services to enable support for a much larger number of sites, and allows requests to be made through a simple form.

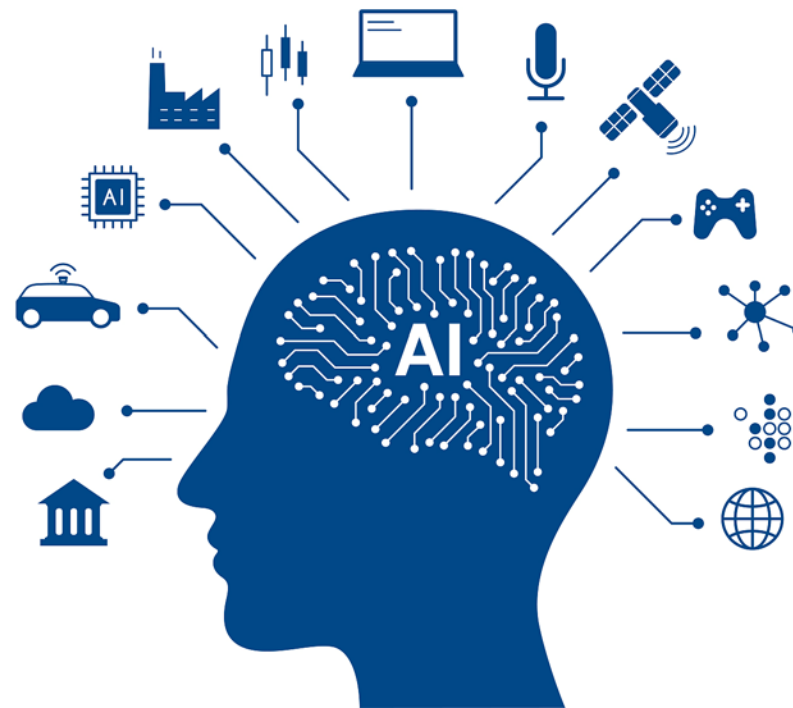


2.2 调研内容——AI技术



先进的AI技术与学术服务融合，有效解决了数字学术个性化、情感分析、主题建模、多模态信息识别等问题。

- 自然语言处理
- 机器学习
- 图像处理
- 数据挖掘
- 文本挖掘/分析





SERVICES WE OFFER

In DS Program, a technological center-of-gravity exists at the intersection of *natural language processing* and *immersive visualization*. Using cutting-edge AR/VR interfaces, we are pioneering methods to digitize and explore text-based, physical, and media-based collections at scale while keeping humans in the loop.

COLLECTIONS AS DATA

- **Natural language processing:** With the aid of OCR/HTR (handwriting transcription) and other technologies, we can help you transform "raw" scholarly source material into useful datasets.
- **3D data lifecycle:** We support an interrelated suite of technologies for 3D data, including object/artifact/specimen scanning; immersive analysis across platforms; and data *physicalization* (3D printing). Check out our **Teaching and Learning with 3D Content** service for more.
- See how 3D and natural language processing (NLP) technologies can be combined in text-centric humanities with **Longhand**.

EMERGING TECHNOLOGIES CONSULTING

- **Instructional support:** We'll work with you to integrate emerging technologies (and assessment mechanisms) that can enhance your students' learning experience.
- **Grant development:** We partner with faculty and staff to develop and execute grants. This includes assisting with overall project management activities, technical support, and scholarly support.
- **Lab design:** The program consults with a network of technology spaces on issues related to hardware/software procurement, event programming, and onsite hours.

哈佛大学AI技术包括：

自然语言处理、文本分析、图像处理等。

哈佛大学AI技术 应用场景：

哈佛大学“Digital Archive of Japan's 2011 Disasters”项目收集了日本2011年地震和海啸灾害的相关信息，包括新闻报道、照片、视频等等。这个项目采用自然语言处理分析灾难事件的影响和后果。

[About](#)[People](#)[Grants & Fellowships](#)[Programs & Activities](#)[Digital Initiatives](#)[Publications](#)[Resources](#)

Japan Disasters Digital Archive Project

[JAPAN DIGITAL RESEARCH CENTER](#)[CONSTITUTIONAL REVISION RESEARCH PROJECT](#)[JAPAN DISASTERS DIGITAL ARCHIVE PROJECT](#)

The **Japan Disasters Digital Archive (JDA)** is an advanced search engine for materials from around the globe, building digital repositories about the Great East Japan Earthquake in 2011. The project seeks to collect, preserve, and make broadly accessible many forms of first-hand information and primary documentation of the events of March 11, 2011 and their aftermath. Through the archive, the project aims to provide a public space of information exchange, establish innovative means of organization, access, and integration of materials, and to contribute to teaching, research, and policy analysis both near term and in the future. But most of all, JDA hopes that the archive will serve as a site of shared memories and reflection for those most affected by these events and concerned about their consequences.

JDA actively encourages user submissions of resources such as websites, videos, and photographs, and user testimonials about personal experiences of the disasters and their aftermath. Its innovative map feature visualizes all materials that are tagged with geographic information in real time. And with the nature of sharing and exchanging of collections and presentations, JDA fosters new connections, both between items and among users. This network is ever-expanding, from a major organization that submits thousands of location- and direction-tagged photographs to fellow citizens who submit their family's testimonial to historians who seek to understand the interaction of public and private actors in the relief effort. Thus, the archive is an interactive space that promotes, and indeed thrives on, user participation.

[VISIT THE JDA WEBSITE](#)

2.2 调研内容——服务内容

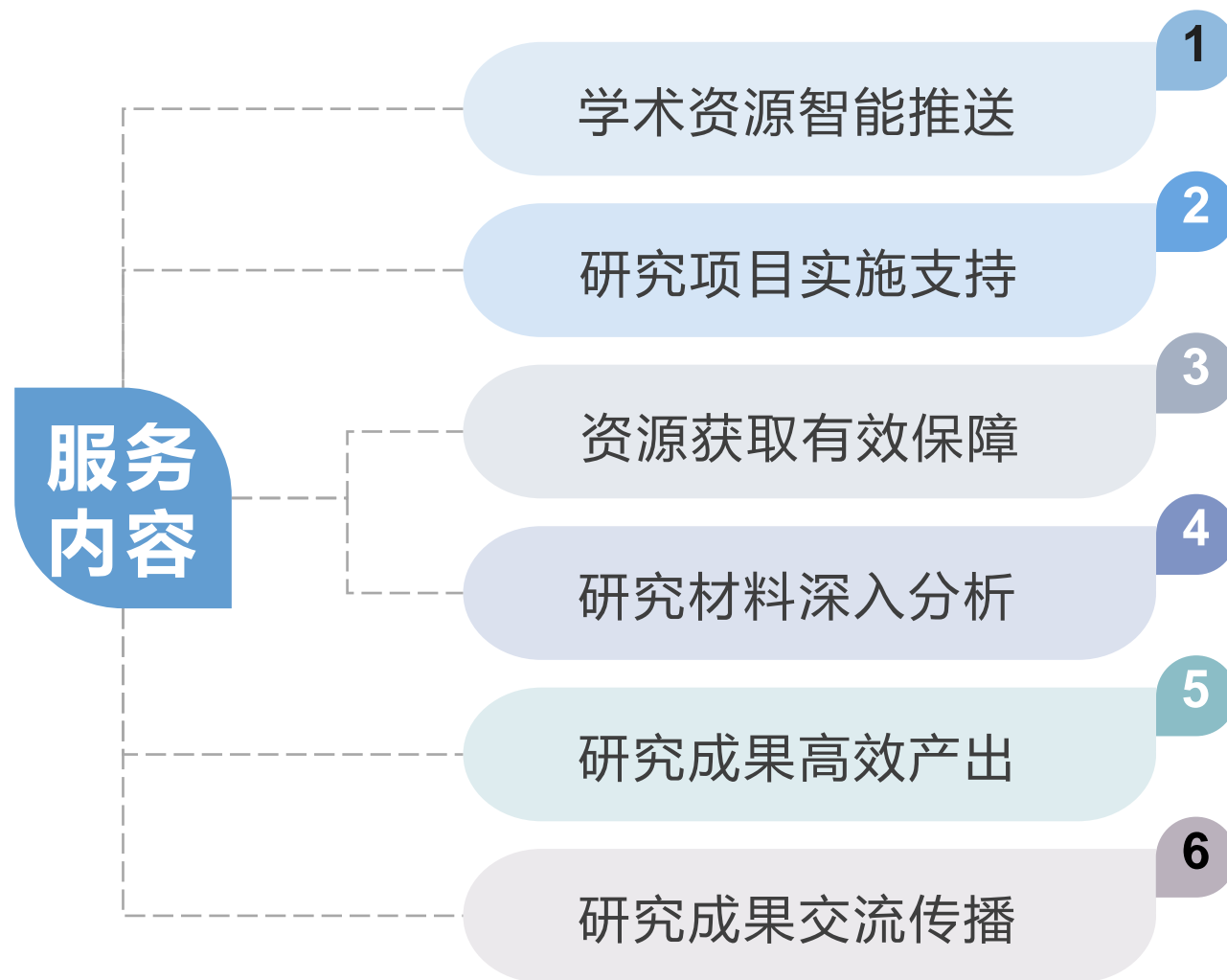


调研13所学校，发现数字学术服务内容包含27个服务范畴：

论文推送、项目管理、寻求合作、资金信息整合、数字化资源和数据库、数据收集工具、数据预处理、文本分析、成果展示与发布、追踪学术影响力、素养教育等。



2.2 调研内容——服务内容



哈佛大学服务内容 包括：

项目管理、寻求合作、
资金信息整合、数据
预处理、文本分析、
成果交流共享、数字
素养教育等。

(<https://dssg.fas.harvard.edu/>)

The screenshot displays the Harvard University Digital Scholarship website. The top navigation bar includes links for HOME, INITIATIVES, EVENTS, NEWS, ABOUT THE DSSG, and CONTACT. The main content area is divided into two sections: "Foundations Seminar Series" and "Research Support".

Foundations Seminar Series

The DSSG organizes a year-round seminar series designed to provide training and instruction in digital methods for research and teaching. The seminar series is centered around introductions to digital approaches to research and teaching, which provides a framework for more advanced topics. By first providing a framework, we facilitate a more flexible approach to learning about the wide variety of tools and approaches used in digital scholarship today.

Our approach translates the general research process of the Social Sciences and the Humanities into a data-processing workflow, thus providing a solid intellectual framework to anchor the myriad methodologies, techniques, and tools that comprise digital scholarship. This provides a sound foundation of immediately applicable skills, while also developing a sound foundation of the entire ecosystem to help them make decisions, seek further support, and advanced skills.

The ultimate goal is to offer a conceptual framework that can contextualize the skills acquired in isolation, into a coherent whole, thus offering participants a sense of achievement, thus encouraging them to pursue further development.

Foundations Seminars:

- Fundamentals of Digital Scholarship
- Digital Teaching Methods
- Working With Data

Research Support

The DSSG promotes digital projects and faculty research by providing expert advice, connecting researchers with relevant resources, and building a community of digital scholarship practitioners. Scholars at any point in the research workflow are welcome to schedule consult sessions to learn about considerations when selecting a web platform or development stack; digital tools and methods; finding, collecting, managing, and cleaning data; disseminating results; or directing a digital project. All Harvard affiliates (undergraduates, graduate students, postdocs, professional staff, and faculty) are welcome to start scheduling a consult session with the DSSG by filling out this Google Form.

The DSSG also connects researchers with relevant resources, organizations, and peers. Because we understand the distributed digital scholarship environment of Harvard, we can help scholars identify pertinent Harvard computing resources, technical workshops, internal and external grant opportunities (list), digital scholarship events and conferences, potential collaborators, and external developers.

Recognizing that very little digital scholarship is produced independently, the DSSG promotes collaborative research by fostering a local community of practitioners, primarily through workshops and conferences, and through work with external organizations. If you are looking to join forces with other local or international scholars, the DSSG can help connect you to these networks.

Each DSSG constituent group also directly supports smaller communities of researchers. In some cases, additional support such as project management, custom programming, repository access, or grant consultation may be available for faculty served by these organizations:

Diagram:

The diagram illustrates a research workflow. It starts with "SOURCES" leading to "COLLECT" and "STUDY & INTERPRET". Below this, "DATA" leads to "ACQUIRE" and "ANALYZE & INTERPRET". A double-headed arrow connects the two main stages. Below the "ANALYZE & INTERPRET" stage, there are three sub-steps: "MANIPULATION", "ORGANIZATION", and "VISUALIZATION".

2.3 调研分析



数字基础设施有待整合

- 软硬件设施存在许多重叠
- 各种工具还相对比较分散，功能上既存在重合，也不够全面

业务数据与AI技术有待深度融合

- 学术服务需加深对大数据、用户、产品等思维的运用
- 服务模式的革新亟待大数据、语义技术等技术支持

数字学术服务有待梳理

- 不同服务之间存在数据格式、标准和接口等差异
- 服务与科研生命周期的各阶段没有形成对应



PART THREE

3

路径规划和基本架构



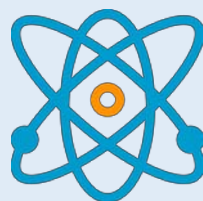


3.1 数字学术服务平台化路径规划

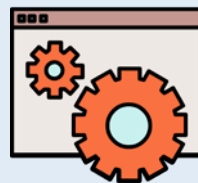


改变以往的单一架构模式转向以中心化、数据化、智能化和协同化为核心的架构成为新一代学术服务架构的发展趋势。本研究按照**整合数字基础设施、搭建融合AI技术的数据中台、构建业务中台**的路径实现基于数智融合的数字学术服务平台化。

3.1.1 整合数字基础设施，优化平台运行效率



通讯网络设施



算力基础设施



工具基础设施

整合数字基础设施，进行集成和优化，实现多维度、多渠道、全天候的数字学术服务，形成**中央化的管理平台**，提高数字基础设施的**集成效率和协作性**。



3.1.2 搭建数据中台，融合AI技术赋能业务



实现步骤	解释
数据融合	实现数字学术服务数据的收集与转换
数据加工	打通科研项目与图书馆管理等的全域数据流
数据可视化	通过数据可视化工具和技术，将数据转化为可视化的图表、报表、仪表盘等形式，使数据更加易于理解和利用。
数据服务	运用机器学习、自然语言等人工智能方法将数字学术服务数据应用于具体学术服务问题

图书馆从数字学术业务视角出发，**梳理统一的数据标准规范**，通过数据中台对**资源数据、业务数据、服务数据和行为数据**进行数据融合、数据加工、数据可视化、数据服务。

3.1.3 构建业务中台，确定平台服务范围



(1) 基于生命周期确定平台服务范围



3.1.3 构建业务中台，确定平台服务范围



(2) 建立业务中台

把现有数字学术服务内容打散、拆分,整合到各共享业务中心,通过共享服务体系建设,将能力服务化和原子化,形成统一的业务中台。



3.2 构建数字学术服务平台基本架构



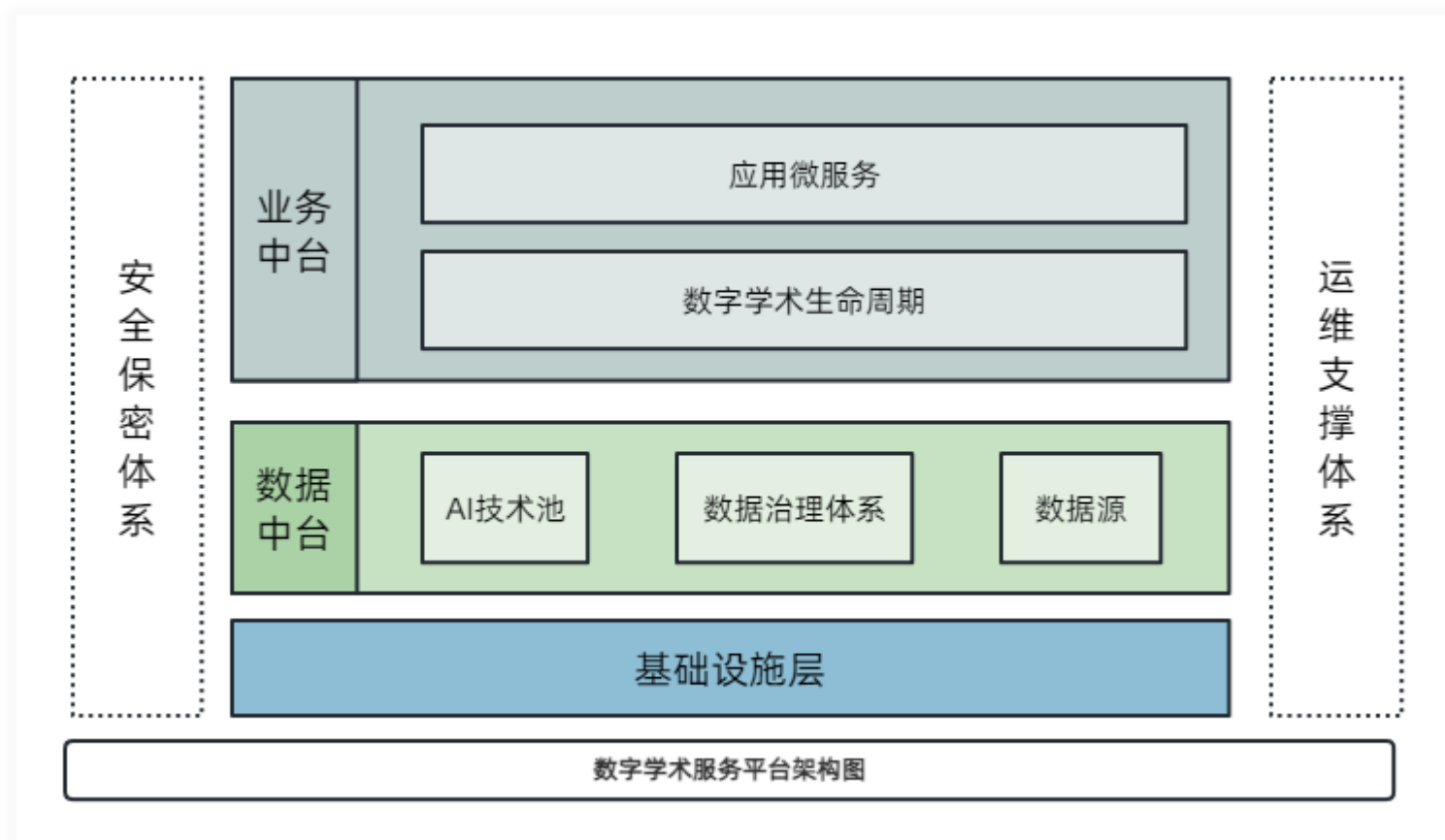
(1) 架构目标:

通过**数智技术**，构建数字中台，将图书馆零散、异构的多源数据进行**多维集成与开发**，形成高校图书馆数字学术数据资产，再将数据资产包装成不同数据产品为各阶段数字学术服务**提供数据支撑**，为学术用户提供**更智慧**的学术服务。

3.2 构建数字学术服务平台基本架构



(2) 架构内容





3.2 构建数字学术服务平台基本架构



(2) 架构内容



建设基础设施层，
提供互联互通基础

构建融入AI技术的
数据中台，实现数
据管理与服务

构建业务中台，运
用微应用实现智慧
服务



PART FOUR

4

数字学术服务平台 应用场景

4 数字学术服务平台应用场景



开展科研数据监护
及保存服务，进行
数据管理和共享



融入数字和开放出
版，加速学术论文
撰写和出版



丰富机构库服务，
扩大学术影响力



构建数字学术数据
空间，加强学术交
流和合作



建设全面、优质数
字资源，开展学术
资源共享和利用





PART FIVE

5

总结与展望



5.1 总结



分析服务维度

调研13所美国高校数字学术服务平台实践情况，分析各高校数字学术服务平台的服务维度；

构建框架模型

构建业务中台、数据中台和数字基础设施3个层次的框架模型；

探讨应用场景

探讨平台如何融入科研数据管理、数字和开放出版、机构库服务、数字学术数据空间和建设优质数字资源等场景。

5.2 展望



技术难题

智能算法的持续迭代突破，服务决策模式对数据算法更加关注，增加了数智化转型的技术难度。

数据安全

需采取严格的数据保护措施，包括数据加密、权限管理、安全备份等。

用户参与度

在建设数字学术服务平台时，以用户为中心，收集用户的需求和反馈。

组织架构

高校数字学术服务平台需建立完善的组织架构和数智化管理团队。

谢谢倾听
敬请批评指正!



中南大學
CENTRAL SOUTH UNIVERSITY

图书馆
LIBRARY