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# iDATA - Orchestrated WiseCIO for Anything as a Service

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**Abstract.** Integral digitalization aims to *liaise* with **Universal** interface for human-computer interaction, *assemble* **Brewing** aggregation via online analytical processing, and *engage* **Centered** user experience (UBC), which enables wiseCIO to orchestrate "Anything-as-a-Service" (XaaS). This paper presents three important concepts such as iDATA, iDEA and ACTiVE that together orchestrate XaaS on wiseCIO. ***iDATA*** stands for "integral digitalization via archival transformation and analytics" in support of content management, ***iDEA*** denotes "intelligence-driven efficient automation" for UBC processing with little coding required via machine learning automata, and ***ACTiVE*** represents "accessible, contextual and traceable information for vast engagement" with content delivery. Where iDATA is central to XaaS through computational thinking applied to multidimensional online analytical processing (mOLAP). Case studies are through discussed on the **massive** basis through iDATA over broad fields, such as *manageable* ARM (archival repository for manageable accessibility), *animated* BUS (biological understanding from STEM), *sensible* DASH (deliveries assembled for fast search & hits), *smart* DIGIA (digital intelligence governing instruction and administering), *informative* HARP (historical archives & religious preachings), *vivid* MATH (mathematical apps in teaching and hands-on exercise), and *engaging* SHARE (studies via hands-on assignment, review/revision and evaluation). As a result, iDATA-orchestrated wiseCIO is in favor of *archival* content management (ACM) and *massive* content delivery (MCD). Most recently, the comprehensive online teaching and learning (COTL) has been prepared and published as ACTiVE courseware with various multimedia and the student online profiles for paperless homework, labs and submissions. The ACTiVE courseware is integrated with a capacity equivalent to 10,000 + traditional web pages and broadly used for advanced remote learning (ARL) in both synchronous model and asynchronous model with great ease.

**Keywords:** wiseCIO: Web-based intelligent service engaging cloud intelligence outlet · iDATA: integral digitalization via archival transformation and analytics · iDEA: Intelligence-driven efficient automation · ACTiVE: accessible/available, contextual and traceable information for vast engagement · winCOM: Web-intensive composite · UBC: universal liaise, brewing assembly and centered engagement · ACM/MCD: archival content management/massive content delivery · COTL: comprehensive online teaching and learning


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# 1 Introduction: iDEA to Orchestrate XaaS

wiseCIO [1] takes a leadership towards the "Anything as a Service" or XaaS era that enhances organizational cloud service experience without needing to build their own data-centers and maintain Information Technology personnel [2].

The iDEA of orchestrating XaaS is to dedicate wiseCIO to various cloud services, such as PaaS (a platform for development) and SaaS (a software as a service) by introducing such conceptual models as *integral digitalization* via archival transformation and analytics [3–6], *efficient automation* via machine learning automaton [7–9], and *active servicing* against traditional web content management and delivery [10].

## 1.1 Cloud Service Needs Innovation

With wiseCIO initiating transitioning from "exhausted-ness" to excellence of web service [1], iDEA enables XaaS via integral digitalization, efficient automation and active servicing against traditional web service with following versus':

**LIAR** vs. **LIAiSE:** User interface (UI) is designed to liaise with the client and server (C/S) via enriched interactivity (request) and actionability (reply). However, an unfriendly interface sounds like a LIAR (layouts of interface for action and reaction) due to the "ad hoc creativity" applied to the UI design [11, 12], which may cause unclear actions and unpredictable reactions. The use of iDEA is to automate UI design with little coding required for universal interface via a LIAiSE (layout of interactivity and actionability via intelligent systems engineering).
**AWK** vs. **ACT:** Traditional web browsing by just simply downloading (from a remote website) and overlapping (current context on the client's screen) brings awkward experience to the user, which may cause the user to lose the context "like a chasing after wind (webpages)". The use of ACTiVE archives is to promote user engagement with ACT (accessible, contextual and traceable experience) via ubiquitous service, load-balancing and failover over iDATA.

## 1.2 iDEA for Intelligent Processing on UBC

The novel iDEA refers to two "persons" on the basis of iDATA: a "wise conductor" to orchestrate XaaS via archival content management, and a "CIO (chief-information-officer)" for massive content delivery of intelligence for business, education and entertainment (iBEE) through intelligent processing on UBC that collaborates three cloud services via *universal* interface, *brewing* aggregation, and *centering* user experience as a whole.

**Integral Digitalization:** Integral digitalization promotes transformational and analytical archiving for ACM/MCD [13–15] via computational thinking and manageable processing throughout FIAT approach as follows:

*Feasible Decomposition* represents a computational thinking process of breaking a big problem into smaller problems and archiving them hold their very own part of the whole.

*Integral Pattern Recognition* is a manageable analytical process of looking for a repeating sequence for "brewing" aggregation via reusable retrieval and assembly.

*Agile Abstraction* denotes an extracting and synthesizing process of removing unnecessary parts of a problem and creating a general solution for multiple problems via an agile and bidirectional approach: top-down analysis and bottom-up synthesis.

*Tenable Algorithms* reflect a sequential and concurrent process of step-by-step instructions to solve a primary problem, then other problems without needing additional solutions.

**Efficient Automation:** Efficient automation renovates a series of intelligent processing via three typical cloud services on *universal* interface, *brewing* aggregation, and *centering* user experience as a whole of UBC [16]. The brewing aggregation causes no contextual swapping, and is embodied via integral digitalization in depth as follows:

*Universal Interface* denotes an algorithmic model liaising with human-computer interaction for compatible interactivity and actionability to be automated with little coding required.

*Brewing Aggregation* models a synthesizable process for retrieval and assembly from remote servers via context-aware pervasiveness and OLAP [17, 18] that enables what to retrieve (brewing) and how to assemble (aggregation) through cryptography, availability, load-balancing, and failover (CALF).

*Centered User Experience* engages with hierarchical extensibility and contextuality in depth without context-changes to avoid driving the user like a chasing after webpages [19–21].

**Active Servicing** is central to ACTiVE archives that innovate web-intensive composite (winCOM) to engage with extremely-big size of customers (for the purpose of high availability) as follows:

*Accessibility* to the winCOM (or traditional websites) either uses hyperlinks, or commands in REST APIs [22] to "brew" (bring) out useful information to the users with ease.

*Contextuality* refers to assembling winCOM (depending on how to organize a cloud service in parts) or corresponding with traditional webpages. The winCOM's assemblability makes more sense with sensible contextuality.

*Traceability* over well-archived winCOM is queryable, assemblable and synthesizable (QAS) through absolute path (traditional hyperlink), shortcuts (under the context), and ubiquitous path (specified under control of load-balancing or failover), respectively.

### 1.3 Major Contributions and Organization

Integral digitalization is central to wiseCIO via iDATA that emerges from an innovative roadmap toward XaaS via archival content management and massive content delivery (ACM/MCD).

An innovative roadmap from integral digitalization toward XaaS:
iDATA: FIAT → iDEA: intelligent Processing on UBC → ACTiVE: XaaS

FIAT is the live soul of intelligent processing via digital archives [14] throughout universal liaise, brewing aggregation and centered experience with ACTiVE XaaS.

Major contributions are accountable as follows:

Integral digitalization via a FIAT approach including: *Feasible* decomposition, *integral* patterns, *agile* abstraction, and *tenable* algorithms to promote transformational and analytical archiving for archival content management and massive content delivery (CM/MCD).
Efficient automation throughout UBC processes as a whole to renovate universal liaise between the client and the server, brewing assembly for massive presentation, and centered user experience without being like a chasing after a website.
Active servicing in ACTs to innovate enhanced accessibility, seamless contextuality and queryable traceability over iDATA with vast engagement for better user experience.

The rest of the paper is organized as follows:

*Section 2. LIAiSE in a FIAT approach* to illustrate layouts of interactivity and actionability.
*Section 3. iDEA* for UBC universal liaise, browning aggregation, and centered experience.
*Section 4. ACTiVE XaaS in use* presented as typical applications via cloud services
*Section 5. iDATA* in transition to practical significance and application value, and discusses the scope of future work, and the future plan as well.

## 2 LIAiSE: Layouts of Interactivity and Actionability

Intelligent systems engineering [23] is an interdisciplinary approach on how to engineer, implement and manage complex systems over their life cycles, where iDATA (integral digitalization via archival transformations and analytics) represents the applied intelligence to the multi-perspective approach as illustrated in Fig. 1.

Figure 1 initiates LIAiSE with layouts of interactivity and actionability vai intelligent systems engineering to automate user interface design for user engagement in the exchange of information with computers through brewing aggregation and ACTiVE XaaS for user-centric experience.

### 2.1 Feasible Decomposition for Web-Intensive Composite

In terms of archival content management [24], we have introduced winCOM in support of integral digitalization in a feasible approach. The feasible decomposition represents breakdowns of a “giant” institution (say, Miami University, seemingly like a big bite we can’t chew) into winCOM that are smaller and easy to manage.

Figure 2 illustrates one of the thumb-ups of computational thinking is its feasibility to break down a large university into separate colleges. If the college is still too large to handle, the breakdown process continues until easy enough to manage.

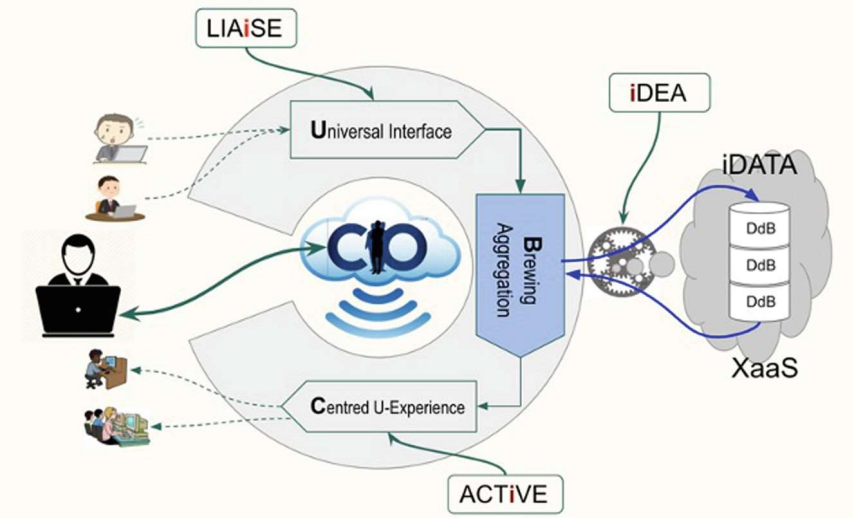


**Fig. 1.** Intelligent systems engineering via iDATA throughout LIAiSE, iDEA, and ACTiVE

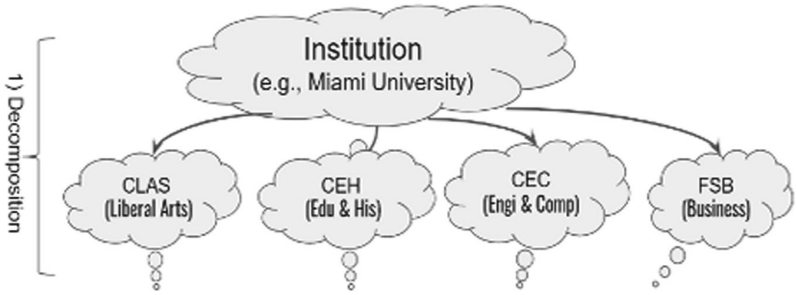


**Fig. 2.** Integral digitalization from feasible decomposition in principle of "divide-conquer"

The decompositional feasibility reflects an idea in engineering that a "college" should be highly cohesive (more interactions within) and lowly coupling (less ties to outside). So winCOM is used to represent logical organization and relational information groupings that are as a whole via QAS (*queryable*, *assemblable* & *synthesizable*).

Feasible decomposition is embodied as layouts of interactivity and actionability in support of the principle of "divide-conquer" for manageability and computability [25].

### 2.2 Integral Pattern Recognition for Iterative Processing Sequence

Integral pattern recognition comes from feasible decomposition via winCOM that does not treat the divided parts mysteriously, but meaningfully analyzed and recognized. The purpose of feasible decompositions is to identify and recognize parts as integral patterns [26] for a repeating sequence that is reusable for similar problems.

Let's take Miami University as an example – there are a couple of colleges underneath, an applicable "repeating sequence" means the similarity of logical organization and personnel in general: a dean, associate dean, an assistant to officials, offices and

academic committee. The winCOM denotes a step forward from the “cloud” (unclear) to the “concrete” (integrally digitalized), as illustrated in Fig. 3.

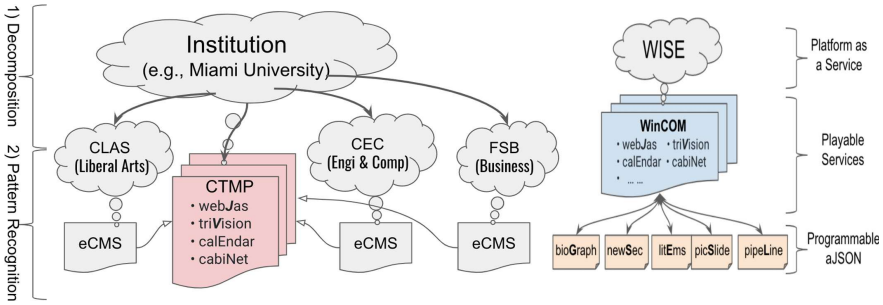


**Fig. 3.** Archival digitalization and transformation through integral pattern recognition

Figure 3 indicates the similar strategy applied to reusable patterns via winCOM that are recognized and reusable patterns in the FIAT approach from a concept (e.g., Miami University), a concrete solution - digital and transformational archives.

At this point, the layout of interactivity and actionability is enabled as a repeating sequence over all colleges through archival transformations and analytics by using playable services and programmable aJSON (sampled data for machine learning) [1].

### 2.3 Agile Abstraction for Essential Solutions Across Variations

Agile abstraction represents gradual understanding for digital reusability of archival components [14, 15]. wiseCIO may involve plenty of complex contents with winCOM to enhance human-computer interaction (*actionability*), engage user experience (*contextuality*) and assemble brewing aggregation (*ubiquity*).

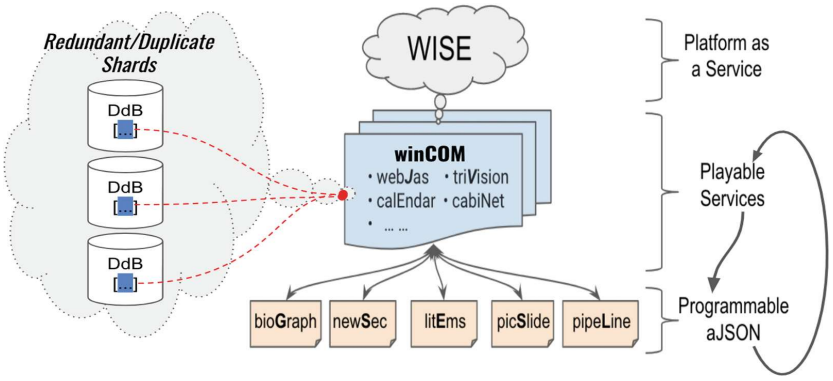


**Fig. 4.** Playable service via hierarchical winCOM and ubiquitous DdB

Agile abstraction also denotes scalability as the size of archival documents, which exponentially increased for digital networking service due to growing and increasing

demand. Abstraction agility [27] can generalize a solution for multi-problems, and allow a specific solution by adding specific parts to the problem, as illustrated in Fig. 4.

wiseCIO represents the trinity of platform of web services, playable winCOM, and programmable aJSON (advanced JSON) in support of agile abstraction with following considerations to scalability [28]:

*An Essential Solution Across Variations* - in reality, there may be tons of problems, and suggested solutions. In a general sense, agile abstraction denotes logical organization and relational grouping in categorized "containers" for easy access, search and assembly such as "shelves," "boxes," "folders," comparable to "situating archives (physical records), designated to hold their very own part of the whole. In a more significant sense, the agile abstraction allows those archival "containers" to be reused without introducing additional archival containers.

*Recursive Containers via winCOM*- a winCOM can be used as recursive containers via archival transformations. For instance, a winCOM can be seen as a top "shelf", a middle level "box", or a bottom "folder" recursively depending on the current context.

*Distributed DocBases (DdB)*- orchestrating winCOM with duplicates and redundancy across clustered servers for agility and scalability in order to grow digital networking service, and manageably increased demand via failover and load-balancing.

A playable service represents a winCOM and the associated archival storage on DdB. a winCOM reflects recursively support for hierarchical extensibility, and the archival DdB promotes analytical synthesis across clustered servers.

### 2.4 Tenable Algorithms via Step-by-Step Actionable Instructions

Tenable algorithms start in an agile developmental approach through step-by-step actionable instructions, then become more sophisticated via a test-driven analytical process. The algorithmic practice in favor of experimental "trial and error" processes via agile pattern recognition and recursive learning inference via archival transformation and analytics that is understood and usable by web-based intelligent service.

Digital archives are prepared for cloud content to be understood and used by a computer [29], and analytical transformation is to make web content useful (actionability), and usable (accessibility). At this point, not everything online is considered as "digitalized". For instance, an uploaded PDF document would be considered a "deaf" content without actionable interaction. However iDATA can turn web content from "deaf" into "digitalized" by the use of machine learning automata [30].

Integral digitalization is the key to machine learning automaton through archival transformations and analytics, which denotes the tenable models to automate data analytics, identification of patterns, and decision making with minimal human intervention. In other words, computer systems are created to perform specific tasks without using explicit instructions, or relying on patterns and inference [31].

The tenable algorithm leads wiseCIO to its intelligent process automation based on feasible decomposition, integral pattern recognition and agile abstraction. This will be discussed in the next section of intelligent UBC processes.

## 3 iDEA: Intelligent UBC Processes

iDEA represents intelligence-driven efficient automation via digital integrity, archival transformations and analytics. The UBC process collaborates three essential cloud services as a whole, including *universal* interface liaising with human-computer interaction, *brewing* (retrieval) assembly from ubiquitously available service, and *centered* engagement for user experience [32] via context in depth and breadth.

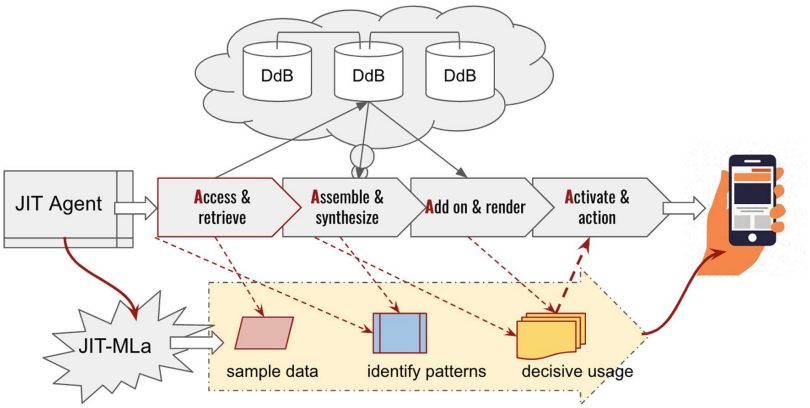


**Fig. 5.** JIT-MLa executes transformational analytics and logical inference over ubiquitous DdB

iDEA initiates a just-in-time machine learning automaton (JIT-MLa) and a series of AAAA tasks: access-assemble-addon-activate, which becomes a renderable presentation with HCI activated. iDEA highly relies on digital integrity through archival transformations, logical inference, and online analytical processing, as illustrated in Fig. 5.

Comprehensive UBC processes are automated to support following services:

- ACOM: archived content management
- COSA: context-oriented screening aggregation
- DASH: deliveries assembled for fast search and hits
- OLAS: online learning via analytical synthesis
- REAP: rapid extension (back-end) and active presentation (front-end)
- SPOT: special points on top on (or hotspot for short)

### 3.1 ACOM: Archived Content Management

Archived content management (ACOM) aims to discover, exhibit, express and present well-digitalized archives in the most convenient way based on feasible decomposition. ACOM is embodied as a twin browsing mechanism in support of both direct accessibility (like traditional webpage) and contextual extensibility as follows:

*Direct Accessibility*: Integral digitalization is always supposed to be sufficient and viewable. A browsing tree (similar to table of contents) is generated and maintained as the

user surfs over. The user can always switch between the current context and table of contents to locate an individual winCOM that is shareable via a playable command interface (PLI), for instance:

```
?cMd=accKey@pathDdB&params      /// RESTful APIs
```

where: *cMd* queries via the access key and interprets the given DdB
*accKey* should be unique within the same DdB
*params* lists Key-Value pairs for possible modification

*Contextual Extensibility*: Well-digitalized archives enhances/strengthens archival transformation and online analytics. The JIT-MLa assembles intelligence via brewing aggregation over the big databases as an add-on subordinate to the context. By applying context-aware pervasiveness, the access key may be retrieved and assembled from multi-DdB, which demonstrates precisely on "brewing" aggregation in support of user-centric experience.

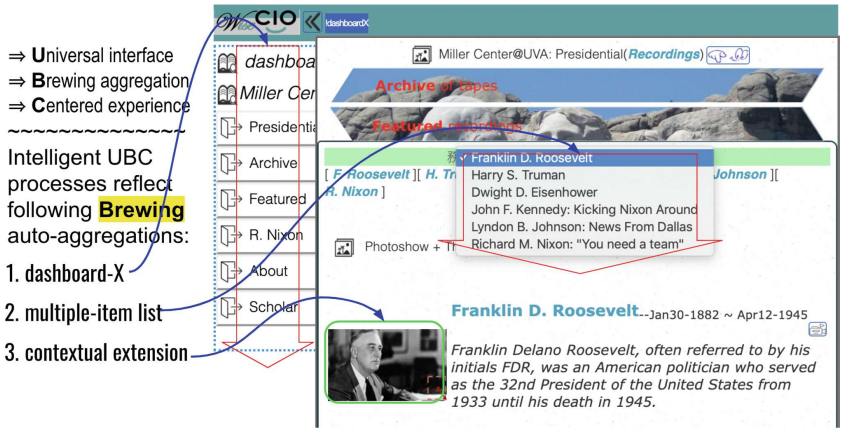


**Fig. 6.** Combinational use of direct accessibility and contextual extensibility

Figure 6 shows you an example of viewing a browsing tree and the brewing web content without swapping the current context. The direct accessibility favors rapid locating and easy entrance to individual winCOM (item: *Andrew Jackson*) while the contextual extensibility (*buttons are extensible*) is applied to embed content as a whole.

All winCOMs in iDATA are supportive for contextual extensibility and that offers user-centric experience via brewing aggregation. AwinCOM can work as an individual "dashboard", which is different from the traditional navigator. The "dashboard" is novel – an innovative navigator for user-centric experience with a highly cohesive context that avoids page swapping. More about contextual extensibility will be in Sect. 3.2 - DASH.

### 3.2 COSA: Context-Sensitive and Screening Aggregation

Context-oriented screening [33] was inspired by resume screening – a recruiter only spends a few minutes on reviewing each submitted resume by searching the predetermined keywords on the applicant's resume. If the matching rate is high, an applicant

will be an initial consideration. The process may fail to find some great applicants, but it is very productive for preliminary screening.

Instead of trying to find any specific contents from a large search engine (Google, Bing, etc.), COSA encourages the users to stay with a subject-based context without swapping pages (websites), so the users can discover their interested contents by searching keywords and viewing the context via the underlying hyperlinks – those links won't cause context swapping.

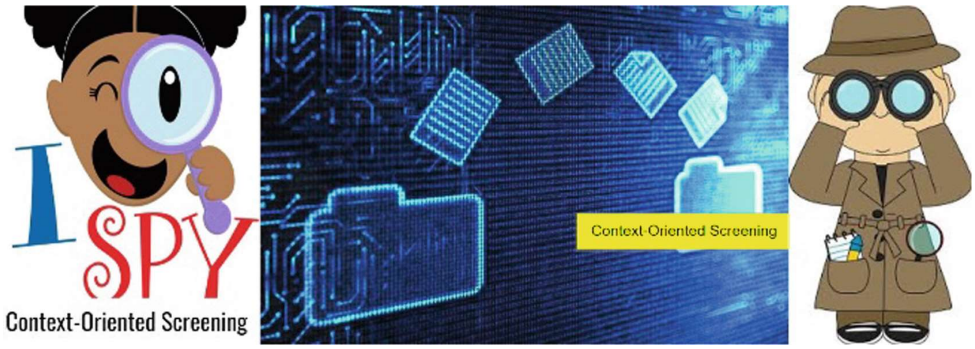


**Fig. 7.** COSA enables proactive brewing aggregation for "zoom-in/out"

COSA-based courseware [34]: For example, the user starts viewing a plain (hyperlink-free) context, so he won't be distracted by any unnecessary content). At his first glance, he can briefly view, and quickly figure out whether to explore the content in depth or to skip. Users can select a different context if they feel unfamiliar with any terminology by searching keywords associated with the desired context. After the JIT-MLa dynamically brews and aggregates content subordinate to the associated keywords, the user looks into the expected context via contextual extensibility as illustrated as Fig. 7.

COSA creates a proactive scenario that offers a better and user-centric experience: Users initially start in brief (without pre-layout of many hyperlinks), and intelligently discover and access interested subjects. As it says, "enough is enough", context-aware pervasiveness will offer "fairly good enough" reference triggered by keywords. Consequently, the user can be supported by dynamic brewing aggregation via JIT-MLa that effectively synthesizes useful and customizable context for individual users accordingly.

### 3.3 OLAS: Online Learning via Analytical Synthesis

Online learning via analytical synthesis (OLAS) is a twin service to COSA that aims to offer users proactive experience – users gets what they want. Cooperatively, OLAS supports COSA by archival transformations with preserved context-aware content reserved through the FIAT approach as follows:

*Online Learning*- basic use of the Internet to deliver online courseware at any time, in anywhere via XaaS. According to eLearning Industry [35], online education is totally worth the effort because a) you can learn whatever you want, b) self-paced learning, c)

lower cost, d) comfort, etc. wiseCIO with its ubiquitous DdB helps create the online learning environment more friendly (context-oriented), more fostering (pondering and rethinking), and more fruitful (analytical synthesis), which would enhance the "readiness to learn without being taught"[1].

*Ubiquitous winCOM*- ubiquitous webcontent feasibly enables a holistic organization via scalable and digital archives from analytical synthesis over the DdB across a cluster of servers. Cloud services with wiseCIO are treated as winCOM of ubiquity that denote accessibility, actionability through archival transformations and analytics.

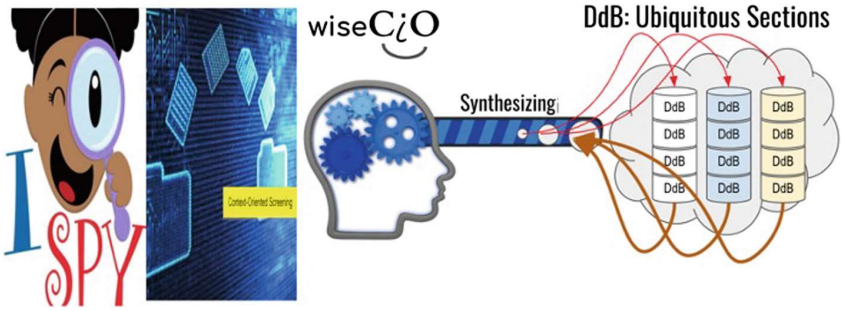


**Fig. 8.** OLAS propagates analytical synthesis over iDATA

Furthermore, the ubiquitous availability means CALF-cryptography, availability, load-balancing, and failover. A winCOM represents an essential unit of logical organization, and relational document groups by associating multiple shardings of content as a whole, as illustrated in Fig. 8.

### 3.4 REAP: Rapid Extension and Active Presentation

At the front-end with ACOM, wiseCIO *liaises* with universal interface to support both direct accessibility and contextual extensibility via winCOM. In addition, wiseCIO with REAP enables ubiquitous winCOM to *engage* user-centric experience in the back-end.

Viewing from the perspective of big databases, ACOM refers to archived content, and REAP refers to rapid extension and active presentation that assembles brewing aggregation through archival transformations and analytics, A winCOM is stored as shards in DdB for rapid assembly (transmissible content) and extension (contextual embedment), and active presentation on the client-side devices., as shown in Fig. 9.

According to the IBM, big data analytics [36] is the use of advanced analytic techniques against very large, diverse data sets that include structured, semi-structured and unstructured data, from different sources. The DdB is deployed on a cluster of servers that are integrally digitalized winCOM with CALF features.

Intelligent UBC processes are greatly orchestrated by iDATA to liaise with human-computer interaction (ACOM, DASH, and REAP), assemble brewing aggregation (OLAS), and engage centered user experience (COSA).

[1] Winston Churchill, "I am always ready to learn, although I do not always like being taught."

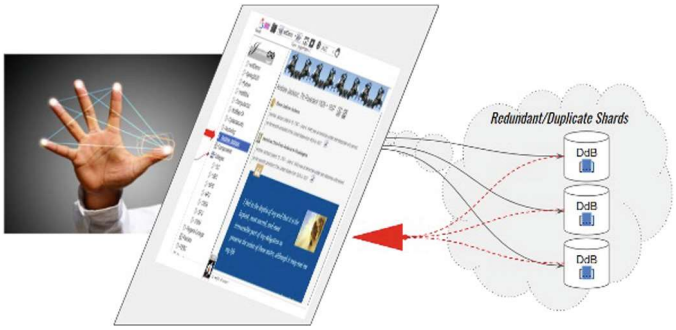


**Fig. 9.** Archival transformations start from actor, through interaction, to assembly

### 3.5 SPOT: Special Points on Top

Special points on top (SPOT) is a graphical user interface that provides at-a-glance views of key performance indicators (KPIs) relevant to a particular objective or business process [37] and extends on wiseCIO within the current context for user-centric experience in particular. wiseCIO has two types of SPOT: *favorite* spot and *thematic* spot as follows:

*Favorite Spot*- the primary winCOM, like a traditional homepage, will offer a favorite spot whose content (like some snacks) is either manually or automatically updated to help the user find things of common interest at a glance.

*Thematic Spot*- the primary winCOM, on the contrary, will also offer a thematic spot whose content (like a major meal) that is prepared, presented and published for users to explore things of deep interest at a fast access.

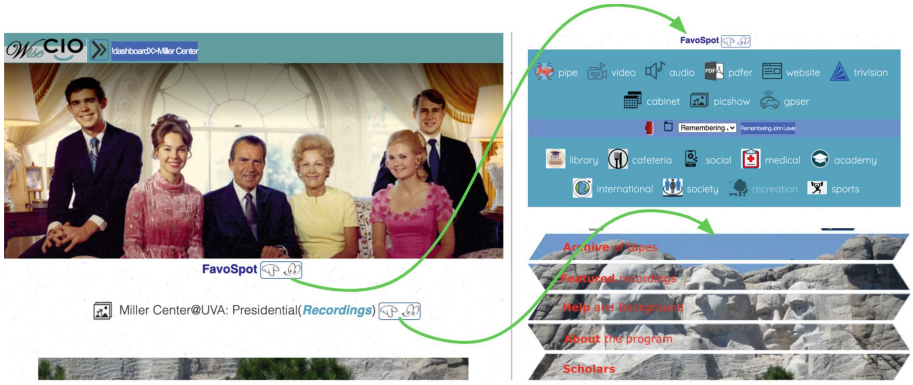


**Fig. 10.** SPOT: Special points on top allow one stop for all (zoom-in/out)

wiseCIO has constructed many dashboard features, such as customized user interface, database-embedded contents prioritized in several editable sections, and favorite functions and commands, etc. For example, after the users open the dashboard sections, they can add/remove/arrange any functions represented in icons, expand or shrink the section of the functions, and switch to another dashboard, etc., which helps users to

locate and organize the information effectively. Within the dashboard section, users can have layouts with multimedia (docs, excels, ppt, audio, video, playlists, etc.).

Figure 10 shows you how wiseCIO provides an innovative user interface that helps enhance user-centric experience especially for young children and elders with little computer/programming experience. The SPOT embodies "one stop service online system" that prioritizes engagement with centered user experience and promotes efficiency and usability of the developed system in use [38].

The Miller Center[2] established the Presidential Recordings Program (PRP) to make these once-secret White House tapes accessible to all who have an interest or investment in the workings of American democracy. For instance, the PRP has five categories, such as "Archives of tapes", "Featured recordings", "Help and background", "About the program", and "Scholars". The thematic SPOT (*Recordings*) automates the best practice as a "one stop service online" that betters user experience of accessibility to citizens, journalists, policymakers, scholars, students, teachers with significant ease.

## 4 ACTiVE: XaaS in Use

wiseCIO uses iDATA to serve XaaS by archival transformations and analytics through intelligent UBC processes. As discussed in previous sections, Computational thinking is applied to integral digitalization via the FIAT approach (abstraction and decomposition, pattern recognition and algorithms), which provides feasibility and agility for a complex and difficult problem to be transformed into a solution.

iDATA supports bidirectional approach: top-down analytical (FIAT) processing and bottom-up transformational synthesis (brewing aggregation into a larger context) [38], as illustrated in Fig. 11.

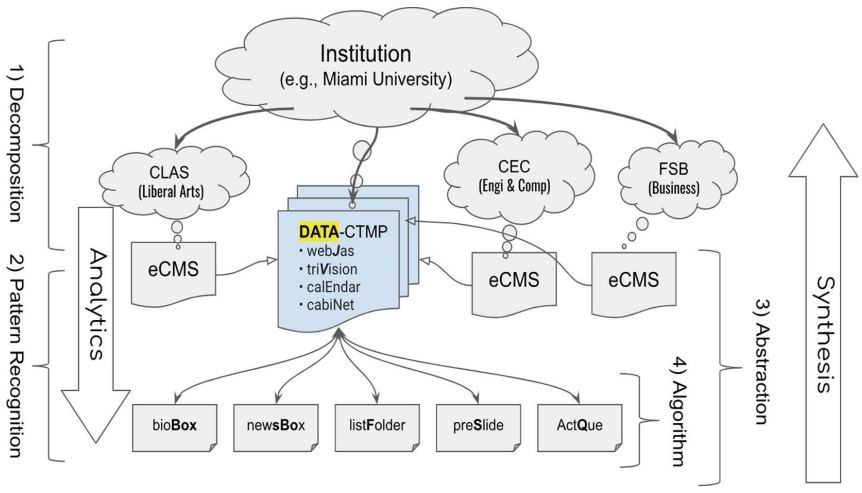


**Fig. 11.** The U-shape approach of digital analytics and archival transformation

[2] The Miller Center established PRP in 1998. Between 1940 and 1973, six consecutive American presidents secretly taped thousands of their meeting and telephone conversations.

Case studies in exploring possible and potential XaaS are discussed on a **massive** basis through ACTiVE mode, that is, accessible/available, contextual and traceable information for vast engagement with managed content for massive deliveries. This section covers efforts to orchestrate following ACTiVE XaaS over broad fields:

- **m**anageable ARM: Archival Repository for Manageable accessibility
- **a**nimated BUS: Biological Understanding from STEM Programs
- **s**entimental DASH: deliveries assembled for fast search & hits
- **s**mart DIGIA: Digital Intelligence Governing over Instruction and Administration
- **i**nformative HARP: Historical Archives and Religious Preachings/Presentations
- **v**ivid MATH: Mathematical Applications in Teaching and Hands-on exercises
- **e**ngaging SHARE: Studies via Hands-on Assignments, Review and Evaluation

### 4.1 ARM[3]: Archival Repository for Manageable Accessibility

Archival repository [39] and manageable accessibility (ARM) greatly impressed me because of wiseCIO's entrance-in-brief (one stop service), and exploration-in-depth (contextual extension). As an archivist, I have years of experience managing and categorizing materials in detail, so I am aware of how deep an archival box would be holding organized materials. An archival box will have a detail-oriented index, and may have more than a hundred folders. Each folder may have labels for the identification of its contents, which are authentic certifications and documents. Some of the papers can be very fragile.

Archiving materials in logical organization and relational document groupings by means of physical archiving and so does digital archiving - for instance, hierarchical layout via contextual expanding or extension for seventh United States President Andrew Jackson [40]. The capability of a digital archive for historical and biographical exploration allows for varied information groupings congruent to distinct aspects of Jackson's life: early life, military career, political life, and latter years through entrance-in-brief, as shown as Fig. 12.

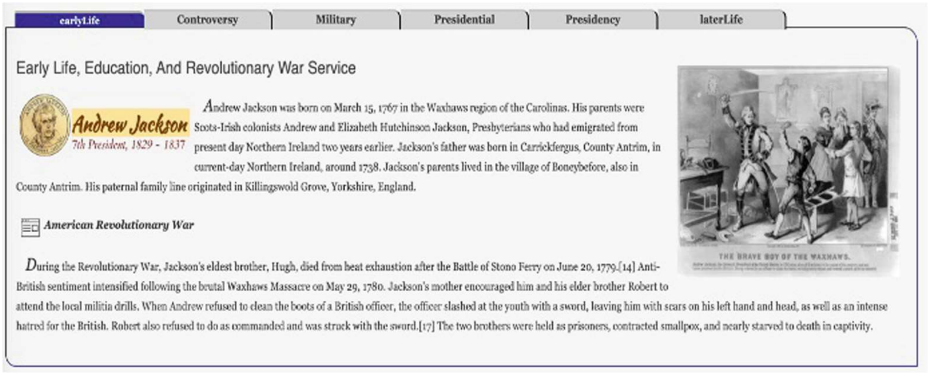


**Fig. 12.** The incredible entrance provides a spectrum through the whole life.

[3] Ms Evelyn Keele, Archivist, TN Room, Jackson-Madison, County Library, Jackson, TN .

*Entrance-in-brief* - wiseCIO lays out digital archives in a very brief layout by which a brief entry may take you through a person's whole life within the same context. For instance, six tabs almost cover (through) Andrew Jackseon's whole life from "early life" to "later life" with rich content associated in groupings, such as related video, websites, and so forth.

*Explore-in-depth* - wiseCIO also supports digital archives through logical organization with considerations to hierarchical depth (as deep as needed) and contextual breadth (as broad as you expect) without forcing the user like "a chasing after webpages". Why? It is all because that hierarchical extensibility allows the user to look into a "drawer" by opening it, and then surf the context by closing the "drawer", which is known as hierarchical extensibility.

In addition, information seekers view primary resource materials and special collections that have been digitalized and context-oriented to provide clear documents of Jackson's life relating to Tennessee State history and United States history. This learner-centered approach allows the researcher to explore those topics as needed. Accompanying digital images of primary resources, such as images of his personal correspondence, provide evidence and clarity of information while being highly interesting.

### 4.2 BUS[4]: Biological Understanding from STEM Perspectives

Computational thinking means not only how we are to think like computers, but also how to make good use of computers via MOLEC (modeling, observing, learning, experimenting and creativity) [41] in support of biological understanding from STEM perspectives.

iDATA is promising on how to digitally archive lecture and lab notes, and experimental labs via modeling, observing, (hands-on) learning with creativity promotes better and deeper understanding. Beta lactams are an important class of antibiotics that work by inhibiting cell wall synthesis in bacterial cells. Biochemistry tutorials help STEM students get better understanding visually by using 3D images, and animated GIF, as illustrated in Fig. 13.

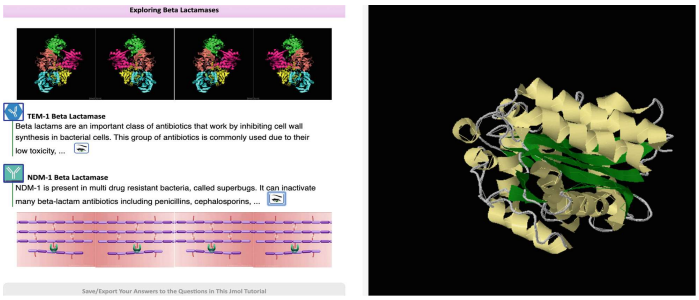


**Fig. 13.** Biological understanding via archived tutorials with Q/A on wiseCIO

[4] Dr Melanie Van Stry: Chair of STEM Division at Lane College, Jackson, TN. STEM stands for Science, Technology, Engineering and Mathematics.

### 4.3 DASH[5]: Deliveries Assembled for Fast Search and Hits

The DASH is sensible to the current context that a user is exploring intentionally or surfing flexibly managed content (winCOMs) and/or manifested content (traditional websites) of his own interest. *Acting* as a dynamic tracking service, the sensible DASH assembles the delivered web content in the meantime collectes its access-keys (similar to URLs) underneath the dashboardX for fast search and hits (used as a menu item to access), reflectively tracking the user's intention, which brings out user-centric experience and engagement through the traceable accessibility.

*Managed content on DASH*- The managed DASH is for winCOMs allowing the preparer of winCOMs to control subjective plants in advance and then dynamic popups as the user surfs to the point. Typically, a winCOM usually represents a one stop service for well-archived documents that supports hierarchical extendibility (*extending*) and contextual synthesis (*shrinking*) within the same context (witout often page-swapping), which reflects user-centric experience. However, the user may also like some traditional browsing experience with page swapping, the managed DASH will meet their needs of "menu-driven browsing".

*Manifested content on DASH*- The manifested DASH is used to support wiseCIO as a browser that allows the user to surf traditional websites. As a work in progress, the manifested DASH is enabled with chosen websites. The criteria for chosen websites are based on how the website is organized subject to the web expert or machine learning automata because the manifested DASH is a fully automated process. It would be risky if a website organized ad-hoc. For the sake of convenience, both manifested DASH and managed DASH can be enabled or disabled up to the user using wiseCIO as a browser.

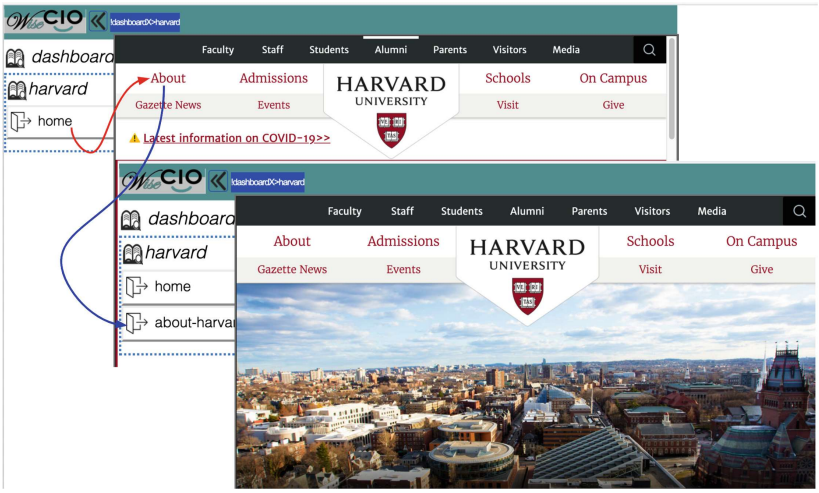


**Fig. 14.** Delivered–assembled for fast search and hits on wiseCIO

[5] Manifested DASH has chosen Harvard University https://www.harvard.edu, one of the best candidate websites, which inspired wiseCIO to do better on DASH for the convenience and user experience.

Figure 14 illustrates the use of Harvard University as a sentimental example - the DASH begins with empty items under dashboardX branch, then automated prompts for fast search and hits until web content is open to explore via wiseCIO.

In addition to excellent features on wiseCIO including intelligent UBC processing with more automation, the use of wiseCIO together with manifested DASH to explore traditional websites (if chosen) will provide new and better user experience than use of other browsers to explore traditional websites.

### 4.4 DIGIA[6]: Digital Intelligence Governing Instruction and Administration

With the demanding role of school leadership, school administrators often find themselves navigating multiple websites to accomplish tasks needed to support teachers and students. Websites inclusive of the district's student information management system, the state's online teacher evaluation system, and resources to help teachers improve instruction for students are among the many visited by administrators daily. Teachers supported by these administrators also find themselves responsible for managing many online resources to support students as well. However, current websites have all useful information archived in a way that the user has to surf around, which sometimes is quite segmentally distractive.

iDATA promises to digitalize archives for instruction and administration which have emerged from wiseCIO, to help prepare (well-archived), propagate (synthesis), and present (renderable & actionable) throughout manageable processing and quick approach. A web-based intelligence service and rich resources in the cloud environment will be useful and usable to support the use of digital intelligence to govern both instruction and administration, as illustrated in Fig. 15.

*Remain focused on primaries* - The scarcity of time in today's schools suggests that there is a need for a user-centred context for use, and wiseCIO emerges at digital age to help educators and administrators remain focused on their primary responsibility of instructing students without being distracted or exhausted in the "oceanic browsing". This interactive platform could also be used to engage students with content in an electronic format as well.

*School leadership experience* - Teachers struggle to organize online resources to incorporate technology into lessons on a daily basis. Though there is already a research


**Fig. 15.** Digital Intelligence Governing over Instruction and Administration

[6] Ms Kimberly N. Quinn, Principal of Denmark Elementary School, Denmark, TN .

based established curriculum, often it lacks a daily technology component. However, there remains a need for student engagement. Despite the lack of planning time available to teachers, Herold notes 28% of principals surveyed thought the integration technologically for all is a transformative method to improve education, and an additional 23% saw it as a promising idea [42].

*Integration of strong curriculum*- wiseCIO may help to integrate well-established strong curriculum into an up-to-date digital platform via a transformatively manageable process that would provide positively profound effects on students' learning. Such a platform would also provide engaging learning opportunities, communication with a network of learners through the internet, innovative ways to assess student learning, and increase in digital fluency. Each of these are necessary skills as students enter the workforce. Additionally, providing students with technological and digital learning experience will also offer equitable learning opportunities for underserved populations [43].

It is the administrator's role to support teachers in the endeavor of integrating technology into their lessons, and it is the district's responsibility to allow autonomy for schools to do so with the understanding that technology based instruction will be paced to support the adopted curriculum. Flexibility of pacing lessons and units should be allowed in order for students to become digitally engaged in such learning.

### 4.5 HARP[7]: Historical Archives and Religious Preachings

As a scholar of religious history and a church historian, I have amassed many years of mining and researching at numerous archival sites and collections across the US. The majority of the physical sites have collections that are paper-based or analog-based, but are increasingly moving to include a wider diversity of digital-based resources.

The majority of the physical sites have collections that are paper-based or analog-based, but are increasingly moving to include a wider diversity of digital-based resources.

"*No archives, no history.*"- Central to preserving and presenting history, archives are crucial for researching and writing a new denominational history. Transforming paper-based or analog-based collections (physical sites) into a wider diversity of digitalized resources holds promise to accessibility and availability in the cloud environment. However many of archives are operating under severe budget and personnel constraints that prevent them from expanding to new digital capabilities that have high value of incorporating emergent digital archiving training and technology.

*"Digital archives, dicent history*- The CME Church Archival collection in Memphis has identified a wide-range of sources ready for digitalization: denominational journals, minutes, reports, pictures, sermons, publications, musical recordings, etc. These sources not only considerably expand the scope of HARP to include more than the collection and preservation of preaching materials but also available, usable and useful online, as illustrated in Fig. 16.

[7] Dr. Raymond Sommerville, CME Church Historian/ Associate Professor of Religion, Lane College, Jackson, TN. He has conducted and experienced archival research at the CME Archival Room, the Tennessee Methodist Archives and Historical Library.


**Fig. 16.** Digital archiving becomes central to a new denominational history

iDATA promises to incorporate HARP in curricular and pedagogical developments at Lane College, particularly in the newly developed interdisciplinary Religion and Arts track. This track will draw on the disciplines of religion, music, and visual arts, proving both foundational courses and area-specific practicums (e.g., preaching in the religious track). An accessible, interdisciplinary archive of sources/resources for religion, music, and art would be useful for research, teaching, and learning. To enhance the curricular and pedagogical effectiveness of these collaborations, faculty and students alike will need some formal training and digital archiving understanding by use of wiseCIO on digital archives and analytical synthesis across multiple departments, such as the Religion and History Departments in HARP collaboration.

### 4.6 MATH[8]: Math Application in Teaching and Hands-On Exercises

In teaching, concrete materials and prompts that are real in students' world of significance help with student's learning. For instance, by making some smiley faces and bringing them to your classroom, you can start with addition, then connect it to multiplication – even if they did not know how to do multiplication, as a last resort, they could count it up, as shown in Fig. 17.

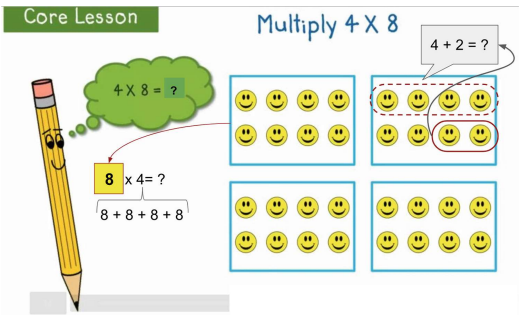


**Fig. 17.** Visual/concrete materials help to see multiplication as "repeated addition"

*Concrete materials*- Digital materials will greatly signify use of "concrete materials" in teaching via hands-on exercises to a visual, interactive and actionable (VIA) extent

[8] Dr Peter McCarthy, Associate Professor of Mathematics, Lane College, Jackson, TN.

that concrete materials can be customized at random. For instance, a girl may like flowers more than smiley faces. By name recognition via machine learning, on the girls screen, the same exercise can have flowers to replace smiley faces. By operating on the VIA materials on the screen acting as a digital "teaching assistant", the teacher may provide students with concrete experiences to help them model, describe, and explore mathematics.

*Experimental illustration*-Addition is essential to multiplication: Use of concrete materials makes learning mathematics experiential so that students can connect multiplication to addition as "repeated addition". They provide students the opportunities to interact with each other, and with the teacher as well.

Hands-on learning is important in the classroom learning experience, so web-based intelligent service helps orchestrate hands-on learning so as to engage students in kinesthetic learning. By operating (dragging and dropping on) visual user interfaces, students may experiment "trial and error", then learn from their mistakes. With wiseCIO the teacher may also create digitally effective learning environments that are valuable to students' prior knowledge. The teacher engages the students in meaningful math lessons and allows students sufficient time to think about, and discuss problems with their classmates.

wiseCIO will help in dynamical VIA means when students enter school seeing mathematics as an integral part of their world. Students' experiences are, therefore, much more global in essence. They can observe and make links to their prior knowledge when sharing their ideas.

wiseCIO allows flexible layouts of often-used icons that provides great convenience via a single block, say "Spring 2020", for instance, there is a set of buttons on the top so that we can conveniently access various online resources, as shown as follows:


wiseCIO provides excellent hands-on learning experience for students. On the top, a group of useful tools laid out as buttons, so students can find various online editor for different programming languages such as Python, Java, C ++, JavaScript and PHP, etc. which enhances students' hands-on programming experience by comparing and learning multiple languages with understanding of an algorithm. Through hands-on exercises in programming, we can write a program to run and test on the webpage. For instance, through hands-on learning, the professor may teach an algorithm in Python at beginning, then gradually transition to other programming languages such as Java, or C++, etc. As a result, "kill multi-birds with one stone", the students may master multiple languages at the same time,

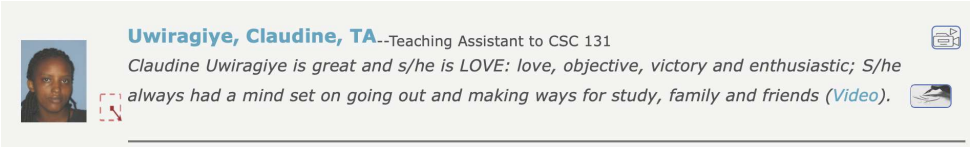


**Fig. 18.** The profile acts as an active section allowing paperless submission, online publishing.

The online service with wiseCIO is not only those posts by the professor, but also allows us to create our own web session within the profile framework so we students can customize our personal profiles. More significantly, we have flexible ways of submitting our work online, which helps us to keep up with our study progress because they are all online paperlessly.

Timely online sign-in is based on a calendar, and we are required to sign-in in the meantime individually by using computers in the lab. The date and time will be recorded when sign-in; also my photo in display indicates my success in sign-in shown in Fig. 18.

In addition, we can find almost all tools related to our studies within the current course modules, such as BlackBoard, Student/Faculty Portal. Worksheet and Schedule, and we're able to communicate with classmates easily because an email button is there.

## 5 Conclusion: iDATA in Transition to XaaS (Cloud Service)

This paper presents a central iDEA for wiseCIO over iDATA to orchestrate ACTiVE XaaS throughout intelligent UBC processes to *liaise* with **universal** interface for human-computer interaction, *assemble* **brewing** aggregation via online analytical processing and *engage* **centered** user exieruece.

**What Has Been Achieved-** wiseCIO as a cloud service platform has emerged with an innovative roadmap from integral digitalization (iDATA) that is intensive with archives and inline synthesis through intelligent processing (iDEA) toward ACTiVE cloud service as follows:

*Digitalizing*- **integral** digitalization reflects *practical significance* via archival transformation and analytics in computational thinking and manageable processing throughout a feasible FIAT approach to enable iDEA for efficient process automation.

*Archiving*- **intensive** archive aims to turn digital documents into a variety of labeled categories of such manageability as queryability, assemblability and synthesizability; where a labeled category could be a "shelf," "box," or "folder" for logical organization and relational groupings in support of archival management (ACM).

*Transforming*- **intelligent** transformations of (raw data) into useful and usable winCOMs that may generate high application values via massive delivery (MCD) of intelligence for business, education and entertainment (iBEE).

*Analytics*- **inline** processing of analytics is to examine information from distributed docBases using mathematical methods and machine learning techniques to find useful patterns and algorithmic fulfilment for information synthesis, which supports winCOM.

**Application Scope and Limitation-**In addition to ACTiVE XaaS (various cloud services) in Sect. 4, wiseCIO has been experimented and applied in broad application scopes, such as "Presidential Recordings Program" (*Miller Center, UVA*), "Parks Canada" (*Canadian National Parks*), Coach New York (*specializing in luxury accessories*), and Remote Online Teaching (*Comprehensive Online Teaching & Learning*), esp during the pandemic since March, 2020, which discloses a quite wide application scope. Although cryptography has "by nature" (considered initially) applied to storage and transmission of all digital documents, wiseCIO has not really been used in financial processing that requires high information security so never got experiment-on-attack against CIA (confidentiality, Integrity, and Availability).

**Future Plan and Further Work-**With fully digitalized documents as winCOMs, wiseCIO is particularly advantageous to archival management and massive delivery (ACM/MCD) through iDATA-based *integral* digitalization, *intelligence*-driven automation, and *information* for vast engagement.

In order to broaden application scope, more effort will be on wiseCIO as an intelligent browser to "brew" traditional websites for better user experience, where integral pattern recognition will play a key role in manifested DASH via machine learning automata.

Universal interfaces liaise with human-computer interaction with great ease. On one hand, intelligence-driven efficient automation is applied to universal interfaces with little coding required, but on the other hand, universal interfaces would be the "first buy of customer" (like or dislike), so some more deliberate work is needed to beautify the universal interface.

Last but not the least, further work will focus on connectivity and adaptability for enhanced cloud service (XaaS). Connectivity is about a "one stop service" that enables wiseCIO to pull existing websites on the platform so as to be beneficial to user-centric experience; adaptability is about capability of how easy to get existing apps/websites assembled as a part.

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