
iCARE-LUX: Instant Cloud Archive Repository Express for Leading-Edge User Experience

Sheldon Liang^{*}, James Pogge, Melanie Van Stry

Computer Science, Mathematics and Science Division, Lane College, Jackson, USA

Email address:

SLiang@lanecollege.edu (S. Liang)

^{*}Corresponding author

To cite this article:

Sheldon Liang, James Pogge, Melanie Van Stry. iCARE-LUX: Instant Cloud Archive Repository Express for Leading-Edge User Experience. *American Journal of Computer Science and Technology*. Vol. 5, No. 3, 2022, pp. 155-169. doi: 10.11648/j.ajcst.20220503.12

Received: June 25, 2022; **Accepted:** July 18, 2022; **Published:** July 29, 2022

Abstract: iCARE-LUX or instant Cloud Archive Repository Express has emerged for leading-edge user experience through algorithmic machine learning that is involved in more and more aspects of daily life through cloud-based content management and delivery (CMD). iCARE acts like a “fastlane” to bridge the gap between DATA and wiseCIO where DATA stands for digital archiving (via transformed analytics), and wiseCIO for web-based intelligent service (engaged with cloud intelligence outlet). iCARE incorporates DATA and wiseCIO into a triad that best serves CMD for leading-edge user experience via algorithmic machine learning. This article presents the archival repository express as a “fastlane” to liaise with human-computer interfacing by providing mathematical and computational solutions to distributed and cloud-based problems. Leading-edge user experience or LUX is user-centric with “luxury” pleasure and inexpensive advantage offered to users while browsing cloud-based content and exploring usable intelligence in support of decision-making. iCARE in collaboration with DATA and wiseCIO establishes a triad of content management and delivery (CMD) as a whole that harnesses rapid prototyping for user interface design without explicitly coding required and propels leading-edge user experience by cohesive assembly from Anything orchestrated as a Service (XaaS). Basically leading-edge user experience makes end-users centered without often webpage swapping during browsing in hierarchical depth via “in-&-out” interactivity, and exploring in contextual breadth via self-paced spontaneity. Furthermore, iCARE or instant cloud archival repository express creatively incorporates *express tokens for information interchange* (eToken) into the CMD triad for integral content under managed with trivial information eliminated. In particular, by exploiting eToken, iCARE promotes seamless intercommunications in-between and empowers users to be QUINARY professionals cohesively, such as *queryable* agent, *ubiquitous* manager, *interactive* expert, *novel* designer, and *available* integrator. More importantly, iCARE uses algorithmic machine learning to coordinate instant publishing over DATA, assemble efficient presentations to end-users via wiseCIO, and aggregate diligent intelligence for business, education and entertainment (iBEE) through elastic process automation.

Keywords: Instant Publishing, Leading-Edge User Experience, Elastic Process Automation Algorithmic Machine Learning, Express Tokens for Information Interchange

1. Introduction

iCARE-LUX - instant Cloud Archive Repository Express has emerged for leading-edge user experience through algorithmic machine learning that is now involved in more and more aspects of everyday life through cloud-based content management and delivery (CMD) [1]. wiseCIO denotes web-based intelligent service engaging with cloud intelligence outlets [2], and DATA represents digital

archiving via transformed analytics [3]. Conceptualized as a “fastlane”, iCARE provides mathematical and computational solutions to distributed and cloud-based problems to bridge the gap between integral content management over DATA and informative delivery on wiseCIO [1-3].

iCARE is central to collaborating DATA with wiseCIO into a triad that best serves cloud-based content management and delivery (CMD) for leading-edge user experience that makes a user centered without often webpage swapping while browsing via wiseCIO and exploring over DATA via

algorithmic machine learning that enables users to browse in hierarchical depth via “in-&-out” interactivity, and to explore in contextual breadth via self-paced spontaneity to aggregate intelligence for business, education and entertainment (iBEE) in support of decision-making [2-4].

Novel triad for content management & delivery

Currently distributed computing and cloud intelligent services are usually presented via a website that is subject to the management and influence of personnel, such as a webmaster, web designers and end-users. There exist so-called “controversial web personnel” whose large teams often have objectives for the websites that fail to consider the services being offered and could lead to controversial agendas [5]. For instance, the controversial scenarios would happen among a webmaster, a web designer, and an end-user: the webmaster oversees and ensures that the technical aspects of a website are met; the web designer is usually responsible for the site’s creative aspects; and the end-user is pleasant to discover useful and usable information in support of decision-making.

As a novel effort made to turn *controversial* agendas into *cohesive* advancement that propels large teams united and working together effectively. iCARE-instant cloud archival repository express to innovate incorporates DATA and wiseCIO into a CMD triad for content management and delivery. As a borrowing term, “DNA” stands for deoxyribonucleic acid that contains units of biological building blocks as a vitally important molecule containing something that makes individuals unique [6]. In addition to leading-edge user experience that makes users centered during browsing and exploring information, CMD triad provides novel solutions via eToken to controversial agendas to support seamless intercommunications among three CMD parties and semantic enrichment from “DNA-like” ingredients to human-computer interfacing that is presentable / renderable through highly robotic process automation [7] where algorithmic machine learning plays a key role in integral content management over DATA and informative delivery on wiseCIO. Algorithmically with practical methods implemented as intelligent services, the CMD triad empowers users to be cohesive QUINARY professionals: DATA acts like a webmaster to ensure that the technical aspects of web content management are met, iCARE advances web-based interface design without explicitly coding, and wiseCIO assists end-users to be an intelligent expert to discover useful and usable information for decision-making.

Chance and Challenge

Both integral content under managed by DATA and informative delivery via wiseCIO are represented in “DNA-like” notations with trivial information eliminated, so iCARE collaborates with DATA and wiseCIO to promote seamless intercommunications in eToken and interoperability via joint tasking services among three CMD parties. iCARE broadly exploits eToken in archival content development to such an extent that a user can be made a web designer, a webmaster and a database administrator with super ease. Specifically,

the user will only need to input “DNA-like” ingredients in dictionary pairs (Key-Value) that are greatly simplified but full of implicit syntactics and semantics in light of algorithmic machine learning. The eToken is dedicated to human computer interfacing design abstractly, but totally different from traditional web development in HTML/CSS/JS and/or PHP/Python.

However, the developmental description in dictionary pairs that shift the sophistication onto machine learning patterns would be too brief or “DNA-like” for a user to grasp, especially for a new-hand user who would not be quite sure until he/she views the visual interfacing and operates interactively. The similar dictionary pairs may vary human-computer interfacing when being associated with a variety of polymorphous (in different forms of development) and powerful machine learning patterns. Without deep understanding, a designer would be challenged with “wishy-washy” objectives. With machine learning, CARE supports semantic enrichment transitioning “DNA-like” eToken into presentable / renderable human-computer interfacing. The instant typing online publishing (iTOP) in eToken turns to immediate visual renderability, actionable interactivity and self-paced spontaneity through robotic process automation, which perfectly embodies leading-edge user experience as a cohesive professional across the CMD triad.

Major contribution

iCARE in collaboration with wiseCIO and DATA utilizes “DNA-like” eToken through algorithmic machine learning to achieve “cohesive” QUINARY objectives as follows:

Queryable Agent aims at informative delivery via wiseCIO with queries to fulfill iCARE (I care) for leading-edge user experience (Section 1 ~ introduction).

Ubiquitous Manager is everywhere across the CMD triad to harness iBEE and propel cohesive assemblies for XaaS (Section 2 ~ interactive CMD).

Interactive Expert helps with intelligence for business, education and entertainment where iCARE collaborates as a whole through digital archiving over DATA and intelligent service on wiseCIO (Section 3 ~ analytical iBEE).

Novel Designer is creative to utilize eToken by instant typing online publishing to support universal interface design and user-centric experience without explicitly coding required (Section 4 ~ eToken-based iCARE).

Available Integrator uses “DNA-like” ingredients to rapid assembly from Anything orchestrated as a Service. Quinary applications will be discussed by using express patterns in eToken (Section 5 ~ Qinary XaaS).

2. CMD Triad Via Algorithmic Interactivity

CMD or cloud-based content management & delivery is conceptualized as a triad for leading-edge experience via Anything as a Service consisting of three correlated aspects: instant CARE collaborated with integral content under managed by DATA, and informative delivery via wiseCIO to

best serve cohesive personnel, illustrated in Figure 1.

With CMD triad diagrammatically illustrated in Figure 1, wiseCIO is created to liaise with universal interface for informative content delivery (iCOD), DATA is evolved to cumulate DNA-like ingredients via digital transformation for

integral content management (iCOM) [1-3], iCARE able to innovate for leading-edge user experience via iTOP as bridging between wiseCIO (of trivial interfacing and tentative interfacing interactivity) and DATA (of integral DNA-like ingredients with no trivial information).

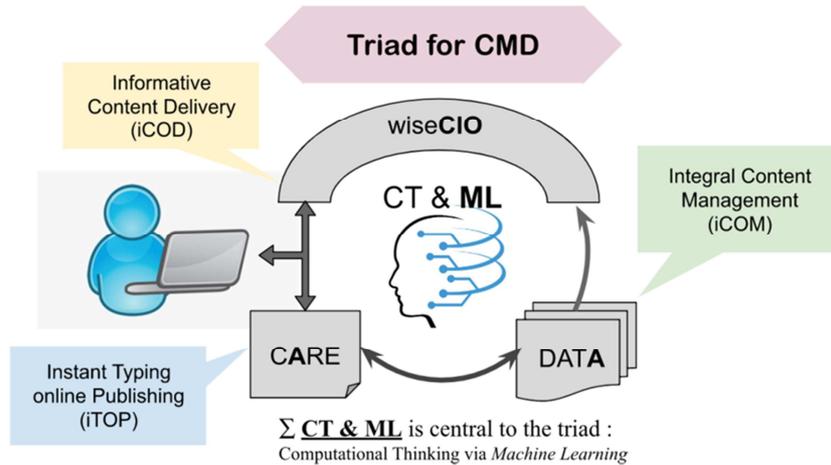


Figure 1. CMD Triad in instant CARE for wiseCIO and DATA.

The article adopts the term of DNA as “DNA-like” ingredients that contain units of building blocks in the CMD triad for essential, vital, and sufficient information utilized for machine learning automata. “DNA-like” ingredients are often used to express leading-edge characteristics that support QUINARY: queryability, ubiquity, interactivity, novelty and availability.

2.1. Integral Content Management Via Digital Archives

The content under managed integrity as a whole plays a key role in online analytics and procedural automation. Where digital archives ensure the content to be *formattable* for computing and processing, *verifiable* for analytical processing, and *cohesive* without unnecessary redundancies. How to format information and digitize content denotes a

means by which a chosen pattern is selected to arrange and store text on a computer or a remote server. The digital pattern promotes integral content management through digital transformation to which algorithmic machine learning can be applied.

Traditional web documents stored remotely as content are trivial via DOM (document object model) in HTML/CSS/JSON, and some data retrieved in JSON from a database may have some digitized features for computing and processing, but all of which primarily serves the sole purpose on how to render content as a web page on the client-side device via retrieving and/or downloading. In DATA, digital archives have been introduced in “DNA-like” notations that serve one of multiple purposes – significant content of the integrity ensured without being trivial HTML/CSS/JSON.

Table 1. An illustrative “DNA-like” notation to serve rendering and action.

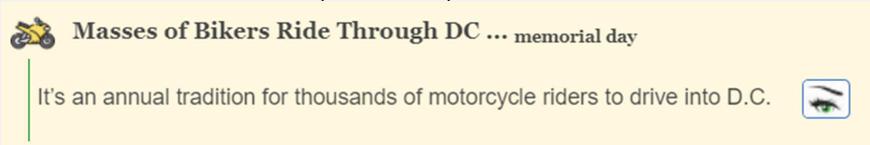
DNA-like notation	Actionable rendering in display and comments
@NEWS(headLine ,) imgURL ,) videoID ,) newSummary ,) embedded body..)@	The DNA-like notation in brief is so profound to express follows:  Where: <i>headLine</i> : Masses of Bikers Ride Through DC.. <i>imgURL</i> : the icon is <i>actionable</i> to play the news video if exists <i>newSummary</i> : It's an annual tradition for thousands of motorcycles... <i>embedded</i> body of the news with the eye <i>actionable</i> to extend or shrink beneath

Table 1 discloses what “DNA-like” notations look like, and how profoundly they serve multiple purposes. Digital archives are “DNA-like”, intelligent and applicable via algorithmic interactivity to enable UI design with multimedia to play and virtual containers through fold-out / fold-up.

Digitally integrated archives embody iCARE for excellent

novelty characterized as actionability, interactivity and manipulability (AIM) to bridge between wiseCIO (delivery) and DATA (management) via algorithmic interactivity. For instance, the little button on the left enables to play the news-related video or news report, and the eye-button fulfills fold-out (to open the news body) and fold-up (to close).

2.2. Algorithmic Online Analytics Via Machine Learning

OLAP-online analytical processing is a core component of data warehousing implementations enabling fast, flexible multidimensional data analysis for business intelligence (BI) and decision support applications [8]. The innovative online analytical process (iOLAP), specialized from OLAP, aims to computationally examine facts and information for decision-making with actions to be taken to support the CMD triad as a whole for leading-edge user experience through algorithmic online analytics and machine learning. For instance, Table 1 illustrates a scenario of @NEWS notation that the news “headline” is associated with a brief “summary” and a playable “video”, which makes sense on how to drive machine learning to commit the novel AIM of actionability, interactivity and manipulability.

Machine Learning is about using historical search probabilities in order to generate expected search objectives, solutions, and applications given the user’s input action, query, subject, vocabulary choices, problem, or question [9]. Given lack of context, the response may be generic in scope.

Whereas, given repeated uses by an individual or group, the specialization may ensue in order to better fit an intended outcome or focus. Jargon may skew the result culturally or possibly even sub-culturally. This could lead to positive results: quicker utilization and responsiveness; negative results: stereotypical discrimination; irrelevant results: similar nomenclature, but unconnected material; bad results: silo dead ends. Ultimately, machine learning must not be in a vacuum. It must be done with context and in connection to these other features within the utilization of an archival system. As a result, machine learning has been applied to iOLAP based on deep learning that fulfills online service with abilities to learn without being explicitly programmed.

iOLAP is central to the CMD triad through computational thinking via machine learning, as illustrated in Figure 1. It is feasible to apply computational thinking to the universal interface between wiseCIO and DATA, and user-centric experience between iCARE and DATA. Most importantly, a user in general could be a webmaster, a web designer, or an ordinary user in light of the CMD triad.

Table 2. Further illustration for the “DNA-like” notation to serve rendering with actions.

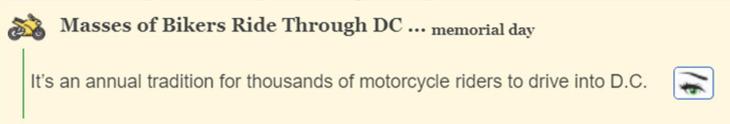
DATA	@NEWS(headLine, imgURL, videoID, summary, emBody)@
iCARE	@NEWS ⇒ headLine *[, item])@ @NEWS is the key for machine learning items via iterative bracket: *[,] headline is the secondary key for the news
wiseCIO	AIM-actionability, interactivity and manipulability as follows: 
AIM	Algorithmic interactivity as follows: <i>headLine</i> : Masses of Bikers Ride Through DC.. <i>imgURL</i> : the icon is <i>actionable</i> to play the news video <i>newSummary</i> : It’s an annual tradition for thousands of motorcycles ... <i>embedded body</i> of the news with the eye <i>actionable</i> to extend or shrink
DATA ← wiseCIO ← iCARE → DATA → wiseCIO	

Table 2, as derived from the previous table, describes multiviews of the NEWS notation with AIM at wiseCIO of actionability for informative delivery, CARE of interactivity for universal interface & experience, and DATA of manipulability on integral content management.

Instant cloud-based archive repository express takes good CARE for CMD between DATA and wiseCIO via machine learning whose AIM is clear to be actionable, interactive, and manipulatable for cloud intelligent service.

2.3. Informative Content Delivery for Decision-Making

Informative content delivery represents digitally transformational processing from integral content (under managed as DATA) to informative content (as processed for use as intelligence). The better user experience signifies the delivery of useful content (to view and think how to use), and usable content to act and interact with the remote service (decision-making).

The valuable significance in a practical approach toward

better user experience is fold-out / fold-up of the detailed content (e.g. under the news). At the first glance at the news, the headlining would be the most attractive, secondary is the summary, and following is the video to play (via the icon), and the folder-out of the news will meet the reader’s curiosity, and all of which reflects user-centric experience that is individualized, interactive, and independent.

User-centric experience with informative delivery also aims to promote browsing in hierarchical depth (in-&-out interactivity), and exploring in contextual breadth (self-paced spontaneity). It won’t be hard to understand by hierarchical interactivity that applied for the news (in Table 2) to folder-out and folder-up without leaving the current context.

As for the contextual spontaneity in breadth for self-paced interest in exploring, a good example is a group of multi-news presented in collaboration with each other. Both universal interface (without explicitly coding) and user-centric experience are applicable through the following example in Figure 2.



Figure 2. Contextual spontaneity in breadth is enabled for self-paced interest in browsing.

Figure 2 discloses that both universal interface and user-centric experience are applied to how to group multiple news for contextual spontaneity in breadth for self-paced interest in exploring. The contextual spontaneity in breadth is individualized for a user to do self-paced interest in exploring without a fixed order. As a result, user-centric experience has been put in practice through both contextual spontaneity and hierarchical interactivity for the sake of hybrid learning engagement.

Presently, the traditional web content delivery could commit some unfriendliness that is against psychological observations in terms of user interface: a) too much information on a given web page would be destructive to a user’s attention according to Dr. George A Miller [10]; b) monotony in the mind causes boredom to mental fatigue by repetition and lack of interest in the details of our tasks (that require continuous attention). That is, too much of the same thing and too little stimulation can cause in its victim an absence of desire and a feeling of entrapment according to “Eight Reasons Why We Get Bored” [11].

Informative delivery via wiseCIO has been fulfilled for

better experience that is user-centric via hierarchical interactivity and user-friendly via contextual spontaneity. The hierarchical interactivity of browsing in depth enables folder-up to help hide too much information from the first glance, and folder-out to disclose the hidden information when desired to go into, which greatly assists the magical number of (7 ± 2) applied to better user experience. The contextual spontaneity in breadth without a fixed order aims at self-paced interest in exploring, which wisely promotes avoidance of boredom in light of monotony in the mind.

3. iBEE via Online Analytical Processing

Instant cloud archival repositories express promises to take CARE of integral content management (over DATA) and informative content delivery (via wiseCIO) of intelligence for business, education and entertainment. Innovative online analytics has been utilized in “fastlane” with CMD triad to support decision making via machine learning patterns [8, 15], as illustrated in Figure 3.

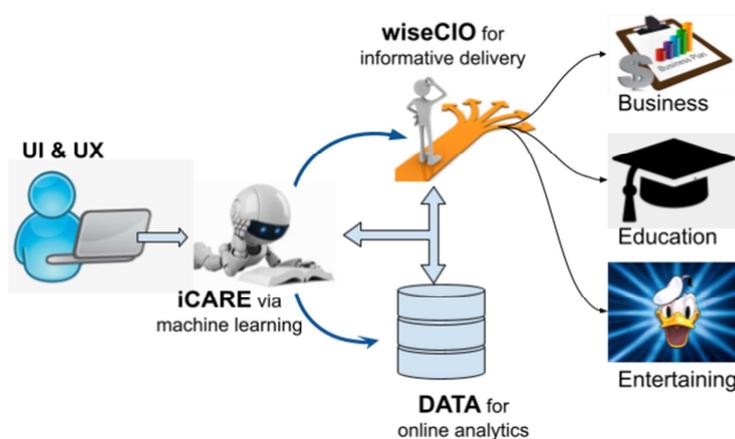


Figure 3. CMD triad serves the user with leading-edge user experience for decision-making iBEE.

In general, iCARE aims to administer the archival repository via “DNA-like” notation for integral content

management over DATA, and acts as an aggregator for informative content delivery on wiseCIO in the “fastlane”

approach. In particular, iCARE is the activator of algorithmic machine learning to orchestrate anything as a service between DATA and wiseCIO as a whole [2-4, 6-7].

3.1. Elastic Process Automation for Online Analytics

A web-based cloud intelligent service may involve very complex scenarios in order to support a large variety of specific situations. The elasticity of automation represents a feasible process that is able to adjust and cover through specific scenarios while staying within the mainstream. Where machine learning plays a key part in recognizing the

@NEWS(headLine1,...imgURL,) videoID,) summary,) emBody)@

@NEWS stands for a pattern on how to present the news.

Parameter videoID denotes some elasticity of particular ways to play multimedia as an embedded part. wiseCIO is intelligent to play such multimedia as video, audio, traditional website, and anything via a URL that a browser can access to.

Elasticity, more significantly, is a “trade-off” between the V-Layout (of bulletins) and multiTab of grouping News via algorithmic interactivity according to the view resolution.

Algorithmic interactivity represents parameterized and patterned solutions to content management and delivery. It is possible for algorithmic interactivity to vary for “One-Size-Fits-All” through elastic process automation.

3.2. Business Intelligence Via Automated Processes

One of the significant objectives of intelligence via online analytics for business is to utilize business data to drive decision making. To implement this mission, reliable data must be IDEA (integral, digestible, and elastically available) to make decisions for business success trustworthily and dependably. wiseCIO taking particular CARE of intelligence for business embodies innovative online analytics through elastic process automation over DATA.

What does intelligence mean in general? Basically intelligence represents thinking ability, reasoning ability to understand and learn well in order to form judgments and

context under a specific situation. As part of machine learning, algorithmic processing fulfills online analytics that computationally examines information to find useful patterns [8-9]. At this point, “DNA-like” eToken, express tokens for information interchange, is a great helper to innovative online analytics.

A parameterized pattern implies a particular way in which a piece of algorithm can be created to get some job done and some content organized. Parameterization enables elasticity for procedural automation. Table 3 explicitly illustrates a good example of elastic process automation as follows:

opinions based on reason. Algorithmic machine learning for content management and delivery (CMD) focuses on “DNA-like” ingredients to fulfill iCARE for intelligence in computational thinking through elastic process automation. “Business intelligence” may be a generalized term, and it could be specialized for instructional /educational (business) intelligence, or entertaining intelligence, all of which is assumed to support decision making.

According to the operational definition of computational thinking [12], the CMD triad has been fulfilled in a feasible, operational and optimal approach throughout algorithmic problem-solving processes (shown in Figure 5), such as: 1) by formatting problems the “DNA-like” notations enable a computer to help solve those problems, 2) by logically organizing and analyzing data, archival repository express establishes an analytical and transformational foundation over DATA, 3) by representing data through abstractions such as models and simulations, the iCARE is put for CMD in the “fastlane” through elastic process automation, 4) by identifying, analyzing, and implementing possible solutions, digital archiving and transformed analytics (DATA) for the goal of achieving the most efficient and effective combination of steps and resources, 5) by generalizing and the problem-solving process, wiseCIO transfers the liaison with universal interface to a wide variety of problems.

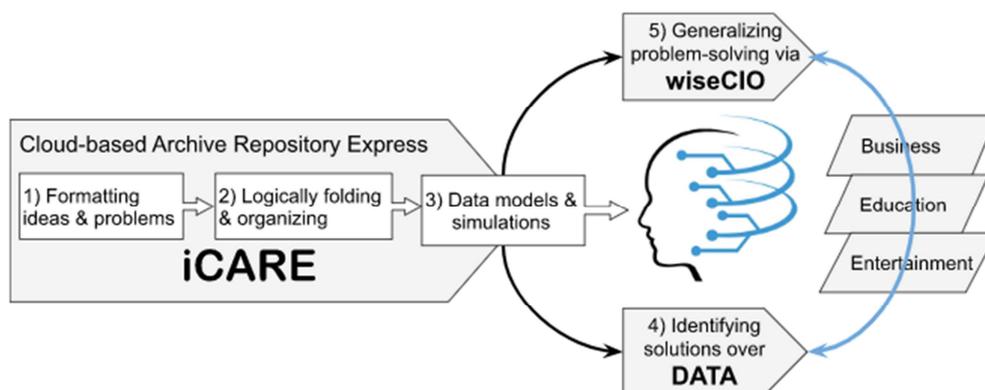


Figure 4. Computational thinking is based on the operational and optimal CMD triad.

Figure 4 Computational thinking via CMD triad is feasible via algorithmic interactivity to liaise with universal interface and user-centric experience. It is also operational through

elastic process automation and optimal for intelligence-driven decision making for Business, Education and Entertainment (iBEE). The highlight in terms of major

contribution of CMD triad is applicable orchestration of Anything as a Service for decision-making.

3.3. Educational Comprehensive Engagement in Learning

EXCEL- educational excellence via comprehensive engagement in learning is considerably a specialized “business” that helps to excel education for student success. In particular, when a courseware (designed for teaching purpose) is prepared and published as an online service, lots of things would be considered as intelligence to assist an

instructor and/or students to make decisions on where, when and how to browse in-depth hierarchy, or glance in-breadth context, and in-detail access, all of which helps to target educational excellence.

Educational excellence is strongly associated with CIA-directed courseware presentation [13] of Contextuality, Interactivity and Accessibility: spontaneous contextuality in breadth, sequential interactivity in depth, and sustainable accessibility in detail, which decisively promotes instructional engagement for student success, illustrated by Figure 5.

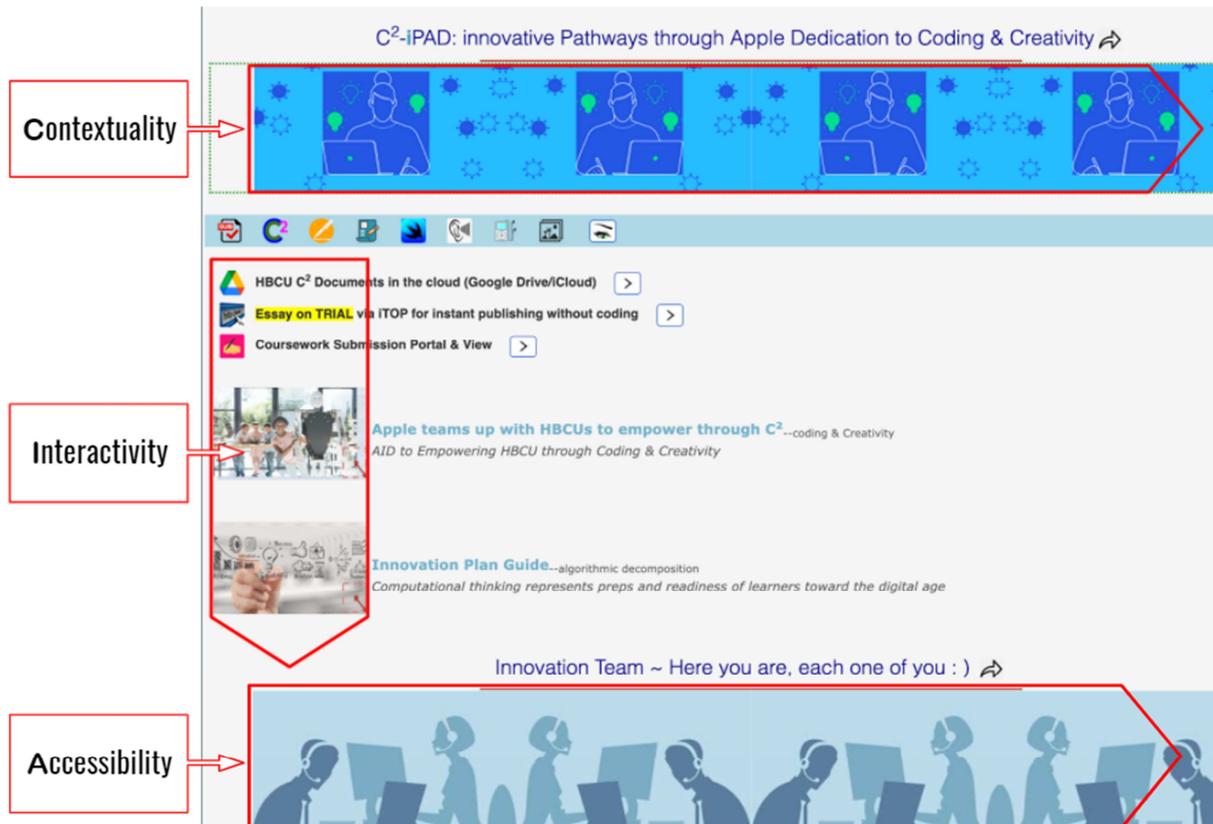


Figure 5. CIA for educational contextuality, interactivity and accessibility.

Figure 5 presents a CIA-directed courseware via a cloud-based intelligent service to promote educational excellence with engagement for student success. The courseware of CIA propels comprehensive engagement in a hybrid instructional approach throughout: a) contextuality in breadth to meet the spontaneous needs of individuals to overview the content, b) interactivity in depth to dedicates students sequentially through learning process (one after another), and c) accessibility to incorporate sustainable advancement on teaching and learning engagement for learner success with individual coursework within profiles. Thorough discussions are made as follows:

Spontaneous contextuality is presented as a top-bar folder beneath which multiple aspects are organized a multiTab so that individuals feel spontaneous to look via the tab at a glance at what is about the course he/she is to study. The top-bar folder enables fold-out / fold-up for the convenience to browse. Also as discussed in 2.3 (informative delivery for better user experience), an individual's spontaneity can help

overcome “monotony” in mind so that an individual would be interested to explore without any boredom.

Sequential interactivity is reflected by left-aligning layouts of major learning modules timely through which a course is taught sequentially. The left-aligned modules are also able to service the learner via “fold-out & fold-up” – collaboratively only one module is allowed in fold-out at a time, and the other in fold-out will automatically turn to “fold-up”.

Sustainable accessibility acts as an intermediate media where all students have their own profile-boxes enabling individuals to instant prepare, present and publish (iPPP) their coursework according to the learning module. An instructor has the privilege to view, grade and interact hybridly with individuals over the submitted coursework for review & revision, and advancement (R²A-rising to grade A).

“CIA-directed” courseware “mirrors” educational intelligence to support hybrid teaching and learning for

student success. It is via comprehensive engagement in learning that educational excellence in spontaneous contextuality (eliminating monotony), sequential interactivity (promoting request & responsiveness), and sustainable accessibility (between instructor and student).

3.4. Entertaining (Netflix-Like) Reactivator

Entertaining reactivator basically acts like Netflix to offer a film and television series library through distribution deals

as well as its own productions. Similarly, the CMD triad is ultimately archiving all kinds of multimedia via algorithmic interactivity for content management and delivery. Contextuality in breadth enables self-paced preview for a heads-up on what a user wants, while hierarchy in depth may apply security levels to manage and control accessibility for commercial purposes. For instance, at a higher level, the multimedia is more general and cheaper, and at a lower level, the multimedia is more special for higher profit, etc.

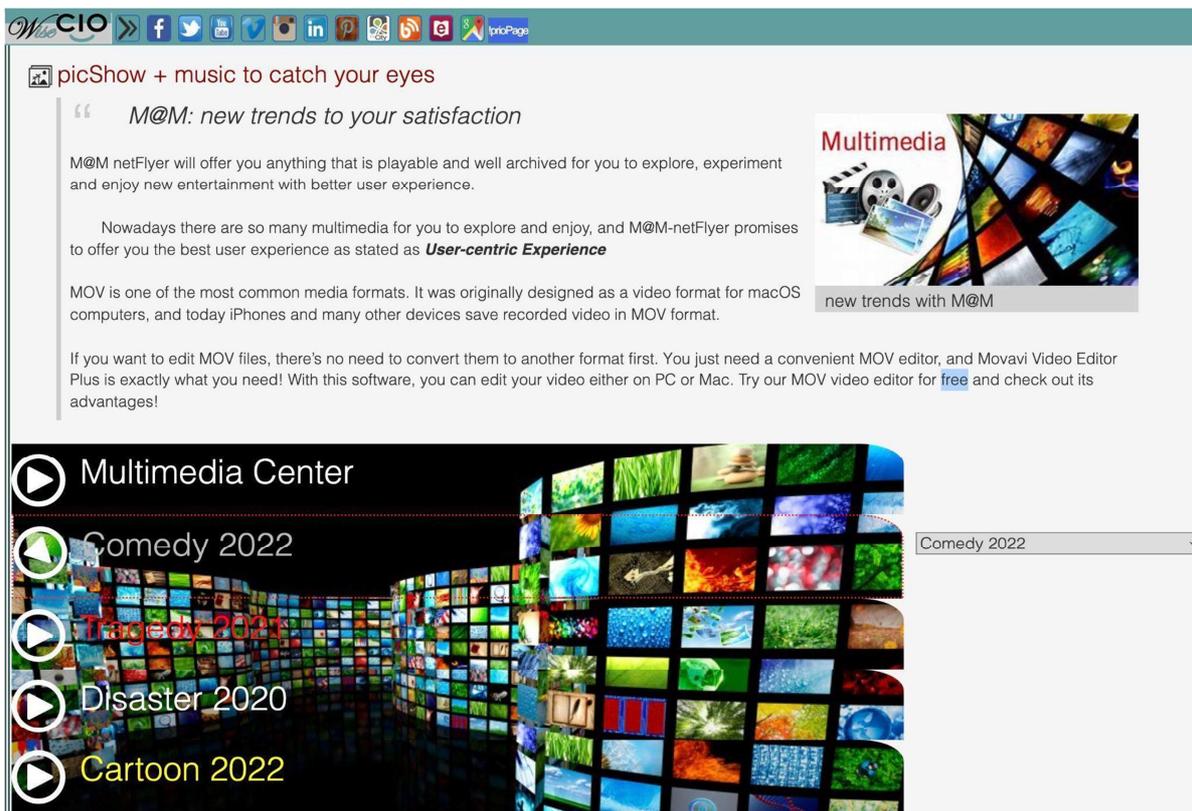


Figure 6. netFlyer service via contextuality and interactivity.

Figure 6 illustrates an entertaining service as an example of well-categorized aspects, such as Multimedia Center (overview for free?), Comedy, Tragedy, Disaster, Cartoon, and Musical. Initially, they are well archived for self-paced preview for free if a user has not purchased anything. On the contrary, those categorized banners automatically turn out to a hierarchical mode for a user to enjoy watching videos, playing games, and so on, which demonstrates individualization and orchestrates Anything as a Service under the category of entertaining service.

For each banner, there is a companion dropdown list that will collect content items at runtime as the user explores under the banner (container or folder) for re-visit as a dynamic menu list. The leading-edge or user-centric experience can be best embodied while alternating different categories in a more friendly means without leaving the current context, which is user-friendly especially in the entertaining service that may have an “oceanic” number of multimedia for a user to explore and enjoy.

iCARE provides a fastlane with eTkin to publish content onto DATA for wiseCIO to aggregate information via online analytics for business, education and entertainment (iBEE). Innovative online analytics via machine learning has emerged as illustrated in Figure 3 in which machine learning plays a key role in automating elastic processes for business intelligence to support decision making.

4. iCARE in Express Tokens for Information Interchange

Cloud archival repositories express aims to bridge the gap between DATA for integral content and wiseCIO for informative delivery by using express tokens for information interchange (eToken). CARE creatively introduced eToken is collaborative and text-based, similar to popularly used data formats such as XML and JSON [14] in support of intercommunications over the Client/Server architecture. However eToken is more advanced than XML or JSON

without explicitly coding required to support seamless intercommunications among CMD triad and semantic enrichment via algorithmic machine learning, as illustrated in Figure 7.

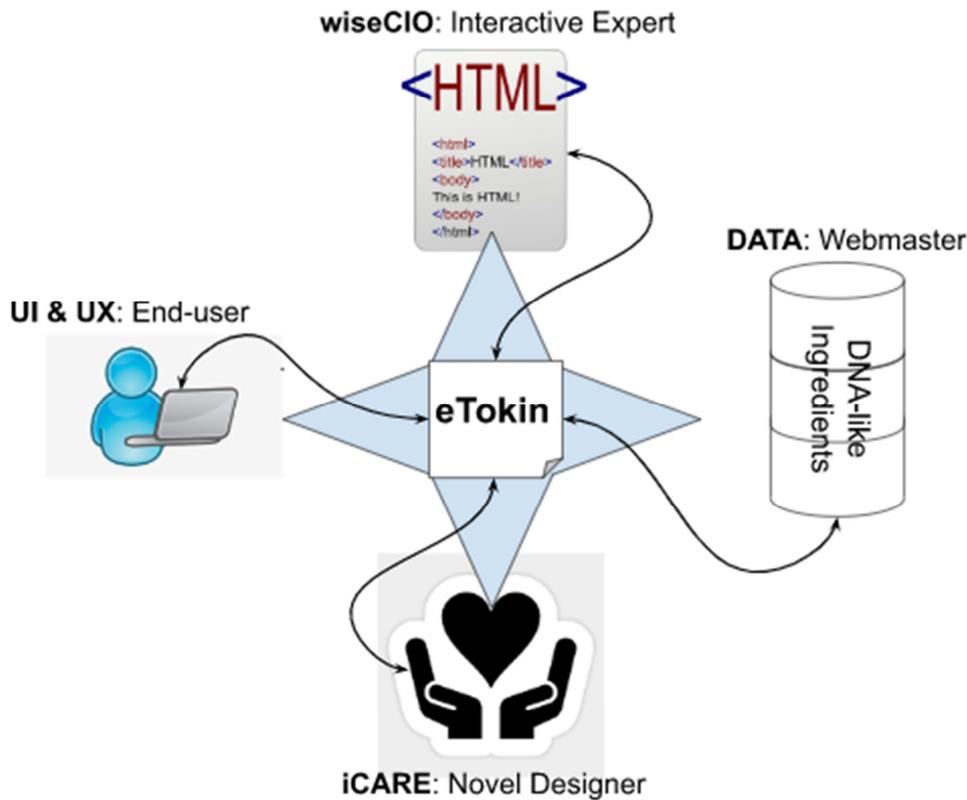


Figure 7. Seamless intercommunication among CMD triad in Express tokens for information interchange.

From the perspective of CARE for UNIX, Figure 7 discloses eToken-oriented CMD triad for seamless intercommunications (arrows pointing toward) and semantic enrichments (away from eToken) among three parties – the former toward eToken eliminates trivial information to guarantee seamless communication with no redundancy, and the latter away from eToken enriches semantics as needed to support informative delivery and integral content under management. Both trivial elimination and semantic enrichment are relying on deep learning experience, and automated by machine learning automaton.

As for cohesive professionals by using instant typing online publishing (iTOP), the end-user can play multi-roles as a novel designer for interface design via iCARE without explicitly coding, a webmaster with technical aspects of a website ensured over DATA, and an intelligent expert aggregating iBEE on wiseCIO.

4.1. Archival Repository in “DNA-Like” Notations

The archival repository over DATA involves containers, folders, text-based content, and semantic patterns that are all digitized and stored in “DNA-like” notations whose integrity should be ensured for the sake of *transmissible* retrieval with *minimal* bandwidth and *online* analytics through *elastic* process automation. Encryption is optional to apply for security depending on the level of enforced security.

DATA plays a critical role like a webmaster in integral content management that incorporates containers, folders and text-based content for accessibility and informative delivery without unnecessary page swapping. A folder, taken as an example, usually represents a composite item with a title or a caption that may be followed by a brief description, and an end-user can click to open the folder with its body extended beneath. On the other hand, the user can also get the body of the folder shrunk. Such kind of interactivity is known as browsing in hierarchical depth. E.g.,

```
@NEWS(headLine1,...imgURL,) videoID,) summary,)
emBody)@
```

The @NEWS(...)@ denotes a news folder in “DNA-like” notations including a group of ingredients specified with a news headline, an image button (imgURL) to play the news-related video (videoID) if it exists, a brief description (summary), and the news body that is extendable and shrinkable. Apparently how to render the folder via interactivity remains unspecified. @NEWS denotes the means by which semantic enrichment is made by machine learning automata.

4.2. Express Tokens for Information Interchange

The eToken- express tokens for information interchange is introduced and provoked by iCARE to support seamless

intercommunications between DATA and wiseCIO in collaboration. One of the strategies applied to choices of eToken is sufficiency and no redundancy— the former means good enough to fulfill semantic enrichment for aggregating information on wiseCIO, and the latter minimal as needed to support online analytics over DATA without inconsistencies.

iCARE is central to instant typing online publishing (iTOP) with eToken to describe “what to do”, and with “how to do” unspecified. Semantic enrichment highly relies on algorithmic machine learning, which helps to make an ordinary end-user a webmaster able to manage integral content, an interactive expert to deliver useful information, and a novel designer for leading-edge user experience via human-computer interfacing.

eToken is context neutral to describe integral content, informative delivery and instant publishing until a machine learning pattern is applied at runtime, which gives flexibility for universal interface through elastic process automation.

e.g., there is a group of news to be announced, it can be described as follows:

```
#> caption of news section:> values for the section
;] headline~1:> values for the news
;] headline~2:> values for the news
;] headline~3:> values for the news
;] headline~4:> values for the news
```

The above description in eToken is so different from “DNA-like” notations that only key-Value pairs are emphasized and flexible size of items allowed to publish.

Where

```
;] starts the next item to proceed through a loop
:> splits an item in a Key-Value pair, and
```

“values” set a list with more or less applied to support a news report.

Under a specific context, a reasonable machine learning rule is situated at runtime to fulfill semantic enrichment for informative delivery, or integral content for online analytics. For instance, on a cell phone because of the narrow screen, the group of news would be announced in a bulleted list (V-layout), and on the contrary, the news group may be announced in multi-tab layout on a laptop.

Table 3. Contextual spontaneity in breadth for self-paced interest in browsing.

iTOP	eToken for algorithmic interactivity	Interfacing in UI Dictionary												
In-between mappings	Grouping news:> ;] News~1:> news-related values ;] News~2:> news-related values ;] News~3:> news-related values ;] News~4:> news-related values ;] News~5:> news-related values	<table border="1"> <tr><td colspan="2">Grouping title</td></tr> <tr><td>Key#1</td><td>Values</td></tr> <tr><td>Key#2</td><td>Values</td></tr> <tr><td>Key#3</td><td>Values</td></tr> <tr><td colspan="2">.....</td></tr> <tr><td>Key#n</td><td>Values</td></tr> </table>	Grouping title		Key#1	Values	Key#2	Values	Key#3	Values		Key#n	Values
Grouping title														
Key#1	Values													
Key#2	Values													
Key#3	Values													
.....														
Key#n	Values													
V-layout (bulleted list)	AIM at multiTab layouts (actionable, interactive, and manipulatable) Grouping News													

Table 3 shows the idea of context-neutral eToken, and its equivalence UI Dictionary in support of universal interface design without explicitly coding, but algorithmic machine learning is context-specific at runtime. Where iTOP embodies iCARE in some way by which instant typing online publishing supports: a) text-based eToken for content management in storage, online analytics, and machine learning driven automation as well, b) interactive editor in UI Dictionary without markups required so that everybody can perform UI design, and c) bidirectional conversions in-between via friendly user interface.

More importantly, text-based eToken also plays a key part in both seamless intercommunications and semantic enrichment among the CMD triad, as discussed afterward.

4.3. Intercommunications Among CMD Triad

Instant Cloud Archival Repository takes good CARE of Anything orchestrated as a Service via algorithmic machine learning, which establishes seamless communications among three parties of the CMD triad so that interoperability via joint tasking is made automated, interactive, and responsive (AIR).

Instant publishing takes initial CARE to prepare content to be published online, and then integral content is managed over DATA on which wiseCIO promotes informative delivery by aggregating information through online analytical processing. The innovative online analytical process (iOLAP) is a good example that wiseCIO propels interoperability via joint tasking for better user experience with DATA.

Seamless intercommunications between distributed parties of the CMD triad incorporate data transmission and joint tasking through algorithmic machine learning. As previously discussed, eToken is text-based, and created as express tokens for information interchange to promote elastic process automation. The basic strategy applied to express tokens is to *suffice* with AIM at actionability, interactivity and manipulability, *minimize* data storage without redundancy, and *encrypt* networking transmission via cryptography.

Text-based eToken for seamless intercommunications has some similarities to, but is much more advanced than JSON, and/or XML [14] – intelligent (“DNA-like”) ingredients are related to algorithmic machine learning without explicitly coding required. Consequently, CARE is expressed in text-based eToken to incorporate AIM for actionability, interactivity and manipulability on UnIX, which will be thoroughly discussed in the next subsection.

4.4. Semantic Enrichment Via Machine Learning

With three “i” goals in mind, iCARE is introduced as one of the CMD parties to advance as a whole: *instant* publishing, *integral* content, and *informative* delivery. In addition to seamless communication, algorithmic machine learning propels semantic enrichment for Anything as a Service. As mentioned before, JSON and/or XML would be in vain just as data formats that had not been empowered by semantics.

Semantic enrichment advances Anything as a Service with AIM at following characteristics:

Actionability that embodies informative delivery on wiseCIO turns websites from “deafness” (no or less action) into dedication to servicing the end-users to use, webmasters to administer and/or web designers to create cloud-based content under managed over DATA.

Interactivity that denotes iCARE for the CMD triad as a whole promotes ubiquitous management via algorithmic interactivity for active collaboration, friendly incorporation and rapid assembly or integration of Anything as a Service.

Manipulability that collaborates DATA with wiseCIO propels joint tasks for interoperability that composes smaller services into a larger service - or a larger service out of smaller services.

Intelligent services or anything as a service represent what to pursue (information technology for iBEE), and how to perform (operational technology for human-computer interfacing), which will be thoroughly discussed and examined in Section 5.

5. Quinary XaaS Orchestration

QUINARY in general stands for quinary leading-edge experience cases on the basis of instant publishing, integral management, and informative delivery over the CMD triad. In particular, QUINARY represents quinary (five) servicing templates that can be applied to orchestration of Anything as a Service via CARE of queryability, ubiquity, interactivity, novelty and availability.

Quinary applications utilize similar (almost the same) algorithmic patterns [15] that drive machine learning automata for universal interface design and leading-edge user experience without explicitly coding required. This discloses great possibilities for (anything as) a service to be fulfilled by anyone who knows about how to type in the input blanks of UI Dictionary, illustrated in Figure 8.

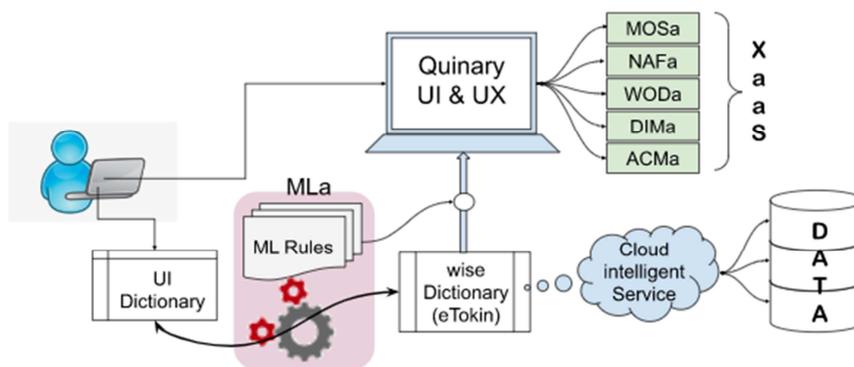


Figure 8. UI Dictionary takes CARE of web design for XaaS over DATA.

Quinary UI & UX represents automated human-computer interfacing design via Machine Learning automata (MLa), in which the UI Dictionary simplifies web development by only inputting Key-Value pairs (dictionary) of nothing to do with HTML/CSS/JS, but “DNA-like” ingredients. The wise Dictionary (eToken), equivalent to UI Dictionary, denotes the bridging between DATA and wiseCIO that is assisted by

algorithmic machine learning - MLa makes the wise Dictionary REAP- retrievable (from the remote server), executable (on the client device), analytical (elastic automation) and pass-along (with UI Dictionary for the user to input with ease).

Specific discussions will be conducted to take CARE of anything as a service as following:

Queryability: word-driven aggregation (5.1)

Ubiquity: digital music avocation in composition (5.2)

Interactivity: montage-selected animation (5.3)

Novelty: programmable assembled machinery (5.4)

Availability: customizable name-featured activation (5.5)

Machine learning, according to IBM Cloud Learn Hub, is a branch of artificial intelligence (AI) through computational thinking, which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy. In this article, thorough discussion will be conducted with heuristics that are used to initiate machine learning through above characteristics, respectively.

5.1. *Queryability: Word-Driven Aggregation*

Word-driven aggregation performs queries to draw attention to similar or opposite wording descriptions. For instance, associating LOVE with a category of loving movies, a user drags the letter “L” lower than “E”, which may lead to “LIKE” (less love) series of multimedia. On the contrary, the user can also drag the letter “L” higher than “E”, which may get to the “AGAPE” (sacred love) series of multimedia. Inversively, if a user drags “LOVE” to the “EVOL” inversively, which may take him/her to the “HATE” (opposite) series. Strategically, word-driven aggregation encourages flexible queries [16] that make human-computer interfacing user-friendlier by applying heuristic wording to facilitate the extraction of relevant data.

Queryability expresses something unsure while a user’s browsing a new / complex website, therefore encouraging the user to ask for more information specific in his/her mind. An initial wording guess acts as heuristics to help the user into a specific field to explore. Machine learning is nothing to do from scratch, but a means of solving problems by discovering things itself and learning from its own experience, in which heuristics, such as an initial wording guess, plays an initial part in proceeding with further exploration.

In cloud-based applications, the word-driven showcase serves with a heuristic wording guess, then engages the user going further and in more depth, which becomes especially effective while exploring entertaining multimedia within a giant number of online resources.

The word aggregated service encourages active exploration to discover things that are interesting to the user from his own experience for individual pleasure in contextual breadth and enjoyment in contextual breadth.

5.2. *Ubiquity: Digital Music Avocation in Composition*

Digital music avocation plays a key part in fostering early-age musical education by recognizing music notes and music composition for fun, which is helpful for a little kid to discover his/her talent in composing music through coding and creativity. Vividly, a kid does compositions of a “song” by selecting and putting musical notes into a queue and he/she can also make chords (playable at the same time) by putting two or more musical notes into the same position in the queue so as to play simultaneously. By purchasing a

piano, it would be more pleasurable for a little kid to learn how to compose a song, but it is apparently too expensive before the parents could find out whether their beloved may have interest in music composition or not. A simple DIMA will do the trick on an iPad or a laptop. In general composability is a business principle that refers to the ability to combine modular business elements as needed [17, 18].

Ubiquity in composing makes “piano” everywhere for musical composition that particularly embodies potential production or creation of music, poetry, or formal writing. Ubiquity via digital music composition aims to foster coding and creativity through computational and compositional activities. Heuristically, a kid can try some pre-prepared musical songs, and based on which he/she can also compose his/her own songs by adding chords (maybe weird or harmony) or replacing some key notes.

Practically digital music showcase provides a web-based keyboard for musical tasting by composing songs, or making chords with super ease. The heuristic virtual keyboard helps a kid recognize musical notes, such C, D, A, B, so that he or she will be interested to compose personal music with a single and two more notes (chords) – the harmony of chords would be felt easily.

The digital music advocacy service embodies coding in practice, testing in performance, and revising in progress to inspire creativity through programmable music composition.

5.3. *Interactivity: Montage-Selected Animation*

Montage-selected animations promote human-computer interfacing via both manual and robotic operations. The former serves for the sake of testing to allow the active user to choose initially, while the latter to automate a process of multimedia in play within a few moments in which the user has no need to take any action unless he/she is willing to.

A selected montage provides a way to control an animation asset that enables a combination of several different animation sequences into a single asset that a user can break up into sections for playback [19]. The concept of animated montage is borrowed to express human-computer interfacing for operational interactivity.

Interactivity helps to involve users in the exchange of information between client devices (e.g., smartphone, tablet, laptop, and computers) and remote servers (or cloud-based Anything as a Service), and the degree to which the exchange of information happens to control robots, robotic process automation, and so forth. Specifically, the enriched interactivity over a cloud-based intelligent service engages users with their exploration of entertaining services without boredom.

Traditionally, a website on display is almost the same with header and footer items, then a user will have to scroll up/down to find a section of his/her interests in. A montage-selected app with a heuristic and visual “montage” enables tab-based multi-sections to present a preview dynamically until the user hits the section to enter for better user experience.

In real applications a montage-selected showcase offers human-computer interfacing with heuristic scenarios that

direct the user to preview primary categories of content, and he/she can choose which one to go while seeing the “montage” representing what his/her interests may really be in.

The montage animated service provides a presentable preview of scenarios through remote exchange of information to control digital robots via robotic process automation.

5.4. Novelty: Assembled Computing Machinery

Assembled computing machinery (ACM) in programming is to simulate coding, which utilizes an assembly-like language to create new apps in a visual approach. An instruction is encoded with an actional token consisting of at least three elements: a) a number (code), b) a wording description (action), and c) a visual illustration, such as an animated Gif, video, or audio. ACM allows users to create their own instruction set and from which they can program fun stories or scenarios in a sequential and/or selective approach. A program via ACM can be written by coding instructions executable with visual illustrations rendered dynamically, so the execution of programs produces a cartoonish movie that is runnably presentable, playable, and programmable (rPPP).

Novelty in programming of data path processing is a universal feature in virtualized networks [20], in particular, a series of instructions can be expressed through sequential (one step after another), and/or selective (out of two branches) order, which simulate programming in assembly-like languages for the sake of instructional teaching. Heuristically, a user can start with a pre-defined instruction set to program an algorithm that is visual (viewable), executable (sequential) and optional (selective). Furthermore, the user can enhance the existing instruction set, or create his own computing machinery with a new instruction set.

Theoretically an assembled computing showcase serves as a virtual computing machinery that supplies an instruction set for coding algorithms, encourages enhancement by adding new instructions into the set, and enables creativity with a new instruction set in support of problem solving of programmability.

The assembled computing service enables rapid prototyping and responsive assembly from the well-categorized multimedia to help users explore various scenarios for kids, adults, and so on.

5.5. Availability: Customizable Name-Featured Activation

Name-featured activation prioritizes available customization to encourage users to explore entertaining multimedia, such as audios or videos without boredom. The initial start is initiated by the user to input his/her name, and the combined name in ASCII generates a key to trigger a group of multimedia for preview until one media is chosen.

Customizable availability represents some adjustment to make responsively to accommodate a user's particular needs so that better user experience can be provided to encourage

and engage a user with something new via cloud-based Anything as a Service. Generally, most websites, starting with a search, offer a group of content with header and footer items for further explorations in breadth. However, a new hand user may have no clue about what to search and where to start. As initial heuristics, letters of a given name in ASCII are combined to bring out the customizable content for the user to get started with great ease.

Psychologically a name-featured showcase provides a customizable preview on the primary category of grouping content. According to Psychology Today - Hello, My Name is Unique [21], “Some parents want names for their children that are unique but not too trendy. Other parents seem to love alternative spellings. How important is a name to our self-perception?” A unique and special name will heuristically lead to pleasant experience while a user exploring entertainment through multimedia.

The name activated service aims for responsive adjustment over multimedia grouping to accommodate a customer's particular needs for better user experience that encourages engagement without boredom.

6. Conclusion

iCARE or instant Cloud Archive Repository Express has emerged for leading-edge user experience through algorithmic machine learning that collaborates integral content management over DATA with informative delivery on wiseCIO. Conceptualized as a “fastlane” into the CMD triad, iCARE paves ways for seamless intercommunications and semantic enrichment in order to achieve the following QUINARY objectives:

Queryable Agent targets informative delivery on wiseCIO with queries to prepare iCARE (I care) for seamless intercommunications among three parties in collaboration with leading-edge user experience through algorithmic interactivity as introduced in Section 1.

Ubiquitous Manager is everywhere across the CMD triad in collaboration with CARE of DATA and wiseCIO to harness intelligence for business, education and entertainment (iBEE) and promote rapidly cohesive assemblies for XaaS as discussed in Section 2.

Interactive Expert aims to aggregate iBEE to support decision-making, where iCARE collaborates with digital archiving over DATA and intelligent service on wiseCIO as a whole via online analytical processing through elastic process automation, as discussed in Section 3.

Novel Designer takes CARE for universal interface design and user-centric experience by instant typing online publishing via express tokens for information interchange (eToken). A novel designer is made via the CMD triad for leading-edge experience through algorithmic machine learning without explicitly coding required as deeply studied in Section 4.

Available Integrator liaises with human-computer interfacing via eToken that simplifies collaborative communications without rendering related redundancies,

propels rapid assembly from digital archives and intelligent service into Anything applicable as a Service for the sake of simplicity and integrity – Quinary applications are discussed to orchestrate XaaS in Section 5.

Visible Accomplishments

Apparently following critical aspects have paved a successful roadmap toward the above accomplishments:

Novel triad provides innovative solutions to distributed and cloud-based problems for Anything to be enabled as a Service to incorporate instant typing online publishing via CARE, integral content management over DATA, and informative content delivery on wiseCIO.

Challenges (vs chances) turn out from controversial agendas into cohesive advancements that propel large teams united and working together effectively. Algorithmically CMD triad, with practical methods implemented as intelligent services, empowers users to be cohesive professionals: like a webmaster over DATA, an interface designer via CARE, and an intelligent expert on wiseCIO to discover useful and usable information in support of decision-making.

eToken denotes express tokens for information interchange through seamless intercommunications and semantic enrichments through algorithmic machine learning.

Future Work and Practice

In addition to feasible accomplishments, there will be more efforts (Figure 9) to make as future work in practice as follows:

- a) *machine learning rules* should be more active to prompt test-driven “sensors” to enable thorough analysis on eToken for the sake of comprehensively semantic enrichment, instead of confused execution because of highly-express (too brief?) tokens for information interchange.
- b) *more sophisticated templates* for domain-specific service will be developed practically and tested thoroughly with a full set of sampling data provided for deep learning on simple imports, execution and testing for customization and development.
- c) *more thorough work* will be conducted on algorithmic sophistication to enhance computing abilities to machine learning to minimize explicitly coding through robotic process automation.
- d) *more practical applications* will be discovered to reflect Anything as a Service and put into practice with a strengthened “brain” in machine learning – through practice, we can gradually collect ourselves and learn how to be more fully with what we do.

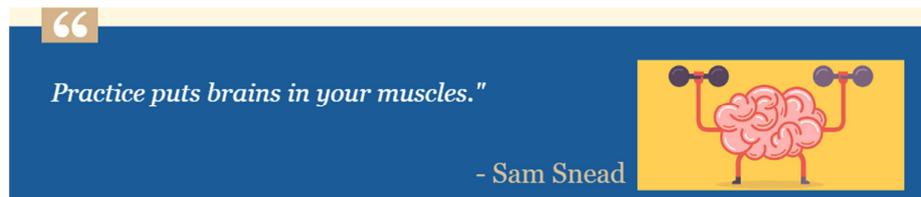


Figure 9. Future work to strengthen iCARE for leading-edge user experience in more practice.

Acknowledgements

This work is partially supported by Department of Education-MESIP Award P120A180072 subaward 161206PMJ157 to M.V.S., National Science Foundation HRD 201138, and Apple- HBCU C2 – Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the Department of Education or National Science Foundation. Our sincere thanks to Ms Sharon Cole (Program Coordinator of Madison County Parks and Creation, Jackson, TN) and Ms Janet D. Gore (Principal, Parkview Academy, Jackson, TN) for summer camp and workshop through Community Education Initiative (CEI) Program that inspires the Quinary Orchestration of Anything as a Service (XaaS), Dr Aminah F. Gooch (director of Lane Summer STEM Research Academy) and Summer Interns: Armon White, Innocent Munezero, Jayleel George, Malcolm Little, and Mohamed Fall for their contribution to QUINARY Orchestration included in the article. Special thanks to Dr Patricia LaGrow (former Associate Provost of the University of Central Oklahoma, Edmond, OK) for her inspirational encouragement when needed and descriptive

wording and writing. Last but not least, I am deeply thankful to Angela Hua for her always-encouragement and love of wiseCIO (!).

References

- [1] Jamest, J., Rajendra, V., Zhang, Y (2012) Content Management and Delivery, Assignee: Microsoft Corp. <https://pubchem.ncbi.nlm.nih.gov/patent/CN-104854842-A>
- [2] Liang, S. Leby, K. and McCarthy, P. (2020). wiseCIO: Web-Based Intelligent Services Engaging Cloud Intelligence Outlet. SAI 2020: Intelligent Computing, Vol. 1, 169-195. DOI: 10.1007/978-3-030-52249-0_12.
- [3] Liang, S., McCarthy, P., and Van Stry, M. (2021). DATA: Digital Archiving and Transformed Analytics, Intelligent Information Management (IIM), Vol. 13, 70-95. DOI: 10.4236/iim.2021.131004.
- [4] Liang, S., Mak, L., Keele, E., and McCarthy, P. (2021). iDATA-Orchestrated wiseCIO for Anything-as-a-Service. FICC 2021: Advances in Information and Communication. Vol. 1363, 401-424, Springer. https://link.springer.com/chapter/10.1007/978-3-030-73100-7_29

- [5] Line25 for web design ideas and inspiration. (since 2009) Top 5 Web Design Debates That Cause the Most Riots. Available from: <https://line25.com/articles/top-5-web-design-debates-that-cause-the-most-riots/>
- [6] National Library of Medicine. Cells and DNA - What is DNA? 2021. Available from: <https://medlineplus.gov/genetics/understanding/basics/dna/>
- [7] SailPoint (2020). Robotic Process Automation (RPA) Technology. Available from: https://www.sailpoint.com/identity-library/robotic-process-automation-rpa-technology/?utm_id=414626189
- [8] IBM Cloud Education. What is OLAP - Cloud Architecture. 2020. Available from: <https://www.ibm.com/cloud/learn/olap#toc-what-is-olap-cEW94rVb>
- [9] Wolfewicz, A. (2022) Deep Learning vs. Machine Learning – What’s The Difference? Available from: <https://levity.ai/blog/difference-machine-learning-deep-learning>
- [10] Miller, G.A. (1956) The Magical Number Seven, Plus or Minus TWO: Some Limits on Our Capacity for Processing Information, *The Psychological Review*. Available from: https://pure.mpg.de/rest/items/item_2364276_4/component/file_2364275/content
- [11] Heshmat, S. (2012). Eight Reasons Why We Get Bored. *Psychology Today*. Available from: <https://www.psychologytoday.com/us/blog/science-choice/201706/eight-reasons-why-we-get-bored>
- [12] DIMACS, NSF (2020, An Operational Definition - What Is Computational Thinking? Rutgers, the State University of New Jersey. Available from: <https://ctpdonline.org/computational-thinking/>
- [13] Liang, S., Mac Carthy, E., C. Hall, C. (2021) Advanced Integral Digitalization to Digital Archiving and Transformed Analytics, SGCI Gateways. <https://www.youtube.com/watch?v=YtqVBR-vi38>
- [14] Microsoft Docs (2021): Windows Communication Foundations (WCF). Mapping Between JSON and XML. Available from: <https://docs.microsoft.com/en-us/dotnet/framework/wcf/feature-details/mapping-between-json-and-xml>
- [15] Misev, A (2012). Algorithmic patterns - Data structures and algorithms in Java. Available from: <https://perun.pmf.uns.ac.rs/java/workshops/Algorithmic-patterns.pdf>
- [16] IGI Global Publisher of Timely Knowledge (2022), What is Flexible Querying. Available from: <https://www.igi-global.com/dictionary/flexible-querying-techniques-based-cbr/11253>
- [17] Jon Radoff (2022). Composability is the Most Powerful Creative Force in the Universe. Available from: <https://medium.com/building-the-metaverse/composability-is-the-most-powerful-creative-force-in-the-universe-e82e3dd83ccd>
- [18] Digital Adoption Team (2021). Composability: A Game-Changing New Paradigm for the Business World. Available from: <https://www.digital-adoption.com/composability/>
- [19] Unreal Developer Network (2022), Animation Montage Overview. Available from: <https://docs.unrealengine.com/4.26/en-US/AnimatingObjects/SkeletalMeshAnimation/AnimMontage/Overview/>
- [20] Fang, J., Karl, F. and Böhringer, K.F. (2011) Assembly Programmability. *The Morgan Kaufmann Series in Computer Architecture and Design, Architecture of Network Systems*, Morgan Kaufmann, Burlington, 267-282. <https://www.sciencedirect.com/topics/engineering/programmability>
- [21] Psychology Today (2016). Hello, My Name is Unique. Available from: <https://www.psychologytoday.com/us/articles/200403/hello-my-name-is-unique>