

CARE: Cloud Archival Repository Express via Algorithmic Machine Learning

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Abstract

CARE-Cloud Archive Repository Express has emerged from algorithmic machine learning, and acts like a "fastlane" to bridge between DATA and wiseCIO where DATA stands for digital archiving & trans-analytics, and wise-CIO for web-based intelligent service. CARE incorporates DATA and wise-CIO into a triad for content management and delivery (CMD) to orchestrate Anything as a Service (XaaS) by using mathematical and computational solutions to cloud-based problems. This article presents algorithmic machine learning in CARE for "DNA-like" ingredients with trivial information eliminated through deep learning to support integral content management over DATA and informative delivery on wiseCIO. In particular with algorithmic machine learning, CARE creatively incorporates express tokens for information interchange (eTokin) to promote seamless intercommunications among the CMD triad that enables Anything as a Service and empowers ordinary users to be UNIQ professionals: such as ubiquitous manager on content management and delivery, novel designer on universal interface and user-centric experience, intelligent expert for business intelligence, and quinary liaison with XaaS without explicitly coding required. Furthermore, CMD triad harnesses rapid prototyping for user interface design and propels cohesive assembly from Anything orchestrated as a Service. More importantly, CARE collaboratively as a whole promotes instant publishing over DATA, efficient presentation to end-users via wiseCIO, and diligent intelligence for business, education, and entertainment (iBEE) through highly robotic process automation.

Keywords

Algorithmic Machine Learning, Express Token for Information Interchange, Instant Typing Online Publishing, Cloud Archival Repository Express

1. Introduction

CARE—Cloud Archive Repository Express has emerged from algorithmic machine learning that is now involved in more and more aspects of everyday life through cloud-based content management and delivery (CMD) [1]. DATA represents digital archiving via transformed analytics and wiseCIO denotes web-based intelligent service engaging with cloud intelligence outlets. Cloud archive repository express is conceptualized as a "fast lane" to bridge the gap between wiseCIO (for informative delivery) [2] and DATA (for integral management) [3] to provide intelligent services and practical methods for cloud-based content management and delivery [2] [3] [4].

CARE is central to collaborating DATA with wiseCIO into a triad that uses intelligent services and practical methods for integral content management and informative content delivery. The CMD triad utilizes algorithmic machine learning to orchestrate Anything as a Service (XaaS) that provides mathematical and computational solutions to distributed and cloud-based problems.

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 designer 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 a web 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 for business, education and enter-tainment (iBEE).

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

Chance and Challenge

Both integral content over DATA and informative content via wiseCIO are represented as "DNA-like" ingredients with trivial information eliminated, so CARE collaborates with DATA and wiseCIO via express tokens for information interchange (eTokin) that promote intercommunications among three parties of CMD triad and interoperability of joint tasking service via algorithmic machine learning. CARE broadly exploits eTokin in archival content development to such an extent that an ordinary user can be made a web designer, webmaster and database administrator with ease. Specifically, the user will only need to input "DNA-like" ingredients in dictionary pairs (Key-Value) that are greatly simplified but full of syntactics and semantics through algorithmic machine learning. The eTokin is dedicated to human computer interfacing, 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 and powerful machine learning patterns. Without deep understanding, a designer would be challenged with "wishy-washy" objectives. As a matter of fact, CARE supports semantic enrichment transitioning eTokin or "DNA-like" ingredients into presentable/rednerable human-computer interfacing through robotic process automation. The instant typing online publishing (iTOP) in eTokin turns to immediate visual renderability and actionable interactivity.

Major Contribution

CARE in collaboration with wiseCIO and DATA utilizes eTokin via algorithmic machine learning to achieve "cohesive" UNIQ objectives as follows:

Ubiquitous Manager: the manager that is ubiquitous across CMD triad takes CARE of DATA and wiseCIO to *harness* iBEE and *propel* cohesive assemblies for XaaS (**Section 2**—interactive CMD);

Novel Designer: the designer is novel to utilize eTokin by instant typing online publishing to support universal interface design and user-centric experience without explicitly coding required (**Section 3**—eTokin-based CARE);

Intelligent Expert: an intelligent expert aims at one of the CMD goals to help with intelligence for business, education and entertainment (iBEE) to support decision-making, where CARE collaborates as a whole through digital archiving over DATA and intelligent service on wiseCIO (**Section 4**—analytical iBEE);

Quinary Liaison: the express data interchange (pattern) is innovated for pure, and "DNA-like" ingredients for the sake of simplicity and integrity without rendering related redundancies. Quinary featured applications are discussed to orchestrate Anything as a service (XaaS) by only using express data interchange patterns (**Section 5**—Qinary XaaS).

2. The CMD Tirad via Algorithmic Interactivity

CMD can be conceptualized as a triad for anything-as-a-service consisting of three correlated aspects: CARE for wiseCIO and DATA, illustrated in **Figure 1**.

With CMD conceptualized in Figure 1 as a triad, wiseCIO is created to *liaise* with universal interface for informative content delivery, DATA is evolved to *integrate* DNA-like ingredients via digital transformation for integral content management [1] [2] [3], CARE is innovated to *automate* via machine learning to bridge the gap between wiseCIO (of trivial interfacing and tentative interfacing interactivity) and DATA (of integral DNA-like ingredients with no trivial information).

This 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 intelligent characteristics that support QUINARY: queryability, usability, interactivity, novelty and availability.

2.1. Integral Content Management via Digital Archives

Integrity of content under management as a whole plays a key role in online analytics and procedural automation where archives are digitized to ensure content is 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 and applied to arrange and store text on a computer. The digital pattern promotes integral content management.





Traditional web documents stored remotely as content are trivia in HTML/ CSS/JSON, and some data retrieved in JSON from a database may have some digitized features for computing and processing, all of which primarily serves the sole purpose on how to render content as a web page on the client-side screen via downloading. Digital archives have been introduced via "DNA-like" ingredients that serve multiple purposes—the integrity makes significant sense with trivia in HTML/CSS/JSON eliminated. **Table 1** shows you what "DNA-like" notations look like, and how profoundly they serve multiple purposes.

The "DNA-like" notation is such an intelligent part in digital archives that algorithmic interactivity can apply to render with UI, to play (multimedia), and to contain virtually though fold-out/fold-up *render* with UI, to *play* (multimedia), and to *contain* virtually through fold-out/fold-up.

Integrity of digital archives represents CARE-featured novelty that is actionable, interactive and manipulable (AIM) to bridge between wiseCIO (delivery) and DATA (management) via algorithmic interactivity.

2.2. Innovative Online Analytics via Machine Learning

OLAP, a core component of data warehousing implementations, enables fast, flexible multidimensional data analysis for business intelligence (BI) and decision support applications [7]. The innovative online analytical process (iOLAP), specialized from OLAP, aims to computationally examine facts and information for use in support of decision-making with actions to take in support of the CMD triad. 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 AIM of actionability, interactivity and manipulability [7].

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 [8]. 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

Table 1. An illustrative "DNA-like" notation is conceptualized to serve rendering and action as stated.

DNA-like notation	Actionable, interactive and manipulatable in display
	The DNA-like notation in brief is so profound to express follows:
<pre>@NEWs(headLine ,) imgURL ,) videoID ,) newSummary</pre>	Masses of Bikers Ride Through DC memorial day It's an annual tradition for thousands of motorcycle riders to drive into D.C.
,) embedded body)@	 headLine: Masses of Bikers Ride Through DC; imgURL: the icon is <i>actionable</i> to play the news video; newSummary: It's an annual tradition for thousands of motorcycles; embedded body of the news with the eye <i>actionable</i> to extend or shrink.

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

Table 2 describes multiviews of the NEWs notation with the AIM at CARE for CMD through algorithmic interactivity, DATA of integral content management via digital archive, and wiseCIO of informative delivery via liaison with universal interface.

Cloud-based archive repository express takes good CARE for CMD between DATA and wiseCIO via machine learning, and the 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 transformational processes 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).

DATA	[@NEWs(headLine ,) imgURL ,) videoID ,) summary ,) embody)@]		
	@NEWs ⇒ headLine *[,) item])@		
CARE	 @NEWs is the key for machine learning; items via iterative bracket: *[,)]; headline is the secondary key for the news. 		
	AIM-actionability, interactivity and manipulability as follows:		
wiseCIO	Masses of Bikers Ride Through DC memorial day It's an annual tradition for thousands of motorcycle riders to drive into D.C.		
$DATA \leftarrow wiseCIO \leftarrow CARE \rightarrow DATA \rightarrow wiseCIO$			

Table 2. The "DNA-like" notation is further illustrated for rendering and action.

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 better user experience that is individualized, interactive, and independent.

User-centric experience with informative delivery also aims to promote hierarchical interactivity in depth, and contextual spontaneity in breadth. 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 browsing, a good example is a group of multi-news presented in collaboration with each other. Both universal interface (without coding explicitly) and user-centric experience are applicable through the following example in **Figure 2**.

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 browsing. The contextual spontaneity in breadth is individualized for a user to do self-paced interest in browsing 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 commits some unfriendliness that is against psychological observations in terms of user interface: 1) too much information on a given web page would be destructively distracting to a user according to Dr. George A Miller [9]; 2) 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" [10].



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

Informative content delivery has been fulfilled for better and user-centric experience via hierarchical interactivity and contextual spontaneity. The hierarchical interactivity of browsing in depth enables folder-up that helps hide too much information from the first glance, and folder-out that discloses 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 fixed order aims at self-paced interest in browsing, which wisely promotes avoidance of boredom in light of monotony in the mind.

3. CARE 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 (eTokin) for the sake of seamless communications among CMD triad and semantic enrichment via algorithmic machine learning, as illustrated in Figure 2.

Figure 3 discloses *seamless* intercommunications as arrows pointing toward the eTokin, and *semantic* enrichment as arrows getting away from the eTokin. The former toward eTokin eliminates trivial information to guarantee seamless intercommunication with no redundancy, and the latter away from eTokin enriches semantics as needed to support informative delivery and integral content under management. Both trivial elimination and semantic enrichment rely on deep learning experience and are done by algorithmic machine learning.

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



Figure 3. Express tokens for information interchange among CMD triad.

3.1. Archival Repository in "DNA-Like" Ingredients

The archival repository over DATA involves containers, folders, text-based content, and semantic patterns that are all digitized and stored as "DNA-like" ingredients whose integrity should be ensured for the sake of online analytics and transmissible retrieval with minimal bandwidth. Encryptography is optional to be applied to the archival repository which depends 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 without unnecessary page swapping. Taking a folder as an example, a folder is usually represented with a title or a caption that may be followed by a brief description, an end-user can click to **open** the folder with its body beneath. On the other hand, the user can also **close** the folder with its body shrinked. Such kind of interactivity is known as browsing in hierarchical depth.

e.g., @NEWs(newsHeadline,) 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.

3.2. Express Tokens for Information Interchange

The eTokin or express tokens for information interchange are introduced and provoked by CARE to support seamless intercommunications in collaboration with DATA and wiseCIO. One of the strategies applied to choices of eTokin is sufficiency, good enough to fulfill semantic enrichment for aggregating information on wiseCIO, and online analytics over DATA without redundancy.

CARE is central to instant typing online publishing (iTOP) that uses eTokin to describe "what to do" with "how to do" unspecified. Semantic enrichment highly relies on algorithmic machine learning that makes an ordinary end-user a webmaster to manage integral content, an intelligent expert to deliver useful information, and a novel designer for human-computer interfacing.

eTokin is context neutral to describe *integral* content, *informative* delivery and *instant* publishing until a machine learning pattern is applied to take actions 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 eTokin is so different from "DNA-like" notations that only keyValue pairs are emphasized and flexible size of items allowed to publis:

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 values that are applied to support an news.

Under a specific context, a reasonable machine learning rule will be provided at runtime to fulfill semantic enrichment for informative delivery, or instant content for online analytics. For instance, on a cell phone because of the narrow screen, the group of news would be announced in bulletin format (V-layout), and on the other hand, the news group may be announced in multi-tab layout on a laptop.

Table 3 shows the idea of context-neutral eTokin in support of universal interfaces without explicitly coding. However, algorithmic machine learning is context-specific at runtime where CARE is embodied by iTOP or instant typing

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

iTOP	eToken for algorithmic ML	Interfacing in UI Dictionary
In-between Mappings	Grouping News: >	Grouping title
	;] News~1 :> news-related values	Key#1 Values
	;] News~2 :> news-related values	Key#2 Values
	;] News~3 :> news-related values ;] News~4 :> news-related values	Key#3 Values
	;] News~5 :> news-related values	Kev#n Values



online publishing that supports: 1) text-based eTokin for content management in storage, online analytics, and machine learning driven automation as well, 2) interactive editor in UI Dictionary without markups required, and 3) bidirectional conversions in-between via friendly user interface.

More importantly, text-based eTokin also plays a key part in both seamless intercommunications and semantic enrichment, as discussed afterward.

3.3. Intercommunications among CMD Triad

CARE takes good care of Anything orchestrated as a Service via algorithmic machine learning, which is established on 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 and then publish online and then integral content is managed in DATA. wiseCIO promotes informative delivery by aggregating information through online analytical processing over DATA. The innovative online analytical process (iOLAP) is a good example that wiseCIO propels interoperability via joint tasking with DATA.

Seamless intercommunications between distributed parties of the CMD triad incorporate data transmission and joint tasking through algorithmic machine learning. As previously discussed, eTokin is text-based, and created as express tokens for information interchange. The basic strategy applied to express tokens is sufficient for AIM at actionability, interactivity and manipulability, and minimal for data storage, transmission, and applied cryptography without redundancy.

Text-based eTokin for seamless intercommunications has some similarities to JSON, and/or XML [11], but is much more advanced as intelligent ("DNA-like") ingredients associated with algorithmic machine learning without explicitly coding. Consequently, AIM at actionability, interactivity and manipulability incorporated as text-based eTokin by CARE will be thoroughly discussed in the next subsection.

3.4. Semantic Enrichment via Algorithmic Machine Learning

With three "i" goals in mind, CARE is introduced as one of the CMD parties to advance as a whole: *integral* content management, *informative* delivery, and *instant* publishing. In addition to seamless intercommunications, 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 without being able to be empowered by adding semantics.

Semantic enrichment by algorithmic machine learning advances Anything as a Service with AIM at actionability, interactivity and manipulability as follows:

Actionability embodies informative delivery on wiseCIO to turn websites into dedication to servicing the end-users, webmasters and/or web designers from "deafness"—just for viewing without acts. **Interactivity** denotes CARE for the CMD triad as a whole under ubiquitous management via algorithmic interactivity for active collaboration, friendly incorporation and rapid assembly or integration.

Manipulability over DATA performs jointly collaborative tasks to promote interoperability that compose 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 4** and **Section 5**, respectively.

4. iBEE via Online Analytical Processing

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, in which innovative online analytics [7] via machine learning has emerged in "fastlane" with CMD in support of intelligence for business, education and entertainment (iBEE), as illustrated in **Figure 4**.

In general CARE stands for the administer of archival repository via "DNA-like" notation for integral content management over DATA, and represents the aggregator for informative content delivery on wiseCIO in the "fastlane" approach. In particular CARE is the activator of machine learning to orchestrate Anything as a service between DATA and wiseCIO as a whole [2] [3] [4] [6] [7].

4.1. Elastic Process Automation for Online Analytics

A web-based and/or cloud intelligent service may involve very complex scenarios in order to support a large variety of specific situations. The elasticity of



Figure 4. CMD triad serves the user on intelligence for business, education and entertainment.

automation represents a feasible process that is able to adjust and cover through specific scenarios while staying within the mainstream, in which machine learning plays a key part in recognizing the context under a specific situation. As part of machine learning, online analytics is considerably an algorithmic process that computationally examines information to find useful patterns [7] [12].

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

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

- @NEWs stands for a pattern in which how the intelligent news is to be presented;
- Parameter *videoID* denotes some elasticity of particular ways to play multimedia as embedded parts. wiseCIO is smart to play such multimedia as video, audio, traditional website, and anything via a URL that a browser can open;
- More significant of elasticity is "trade-off" between the V-Layout 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 via patterned machine learning. It is possible for algorithmic interactivity to be made of "One-Size-Fits-All" through elastic process automation.

4.2. Business Intelligence in Support of Decision-Making

One of the objectives of intelligence and analytics for business is to utilize business data to drive decision making. To implement this mission, reliable data must be available and accessible, integral and digestible so that the decision for business making can be driven trustworthily and dependably. wiseCIO taking particular CARE of intelligence for business is 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 opinions based on reason. Algorithmic machine learning for content management and delivery (CMD) focuses on "DNA-like" ingredients to take CARE of intelligence through computational thinking that is automated via machine learning

According to the operational definition of computational thinking [13], operational computational thinking with the CMD triad has been fulfilled throughout operational and optimal 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



Figure 5. Computational thinking is an operational optimal process via the CMD triad.

over DATA, 3) by representing data through abstractions such as models and simulations, CARE is paid 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.

Computational thinking via CMD triad is conceptualized as algorithmic interactivity of liaising with universal interface and user-centric experience (**Figure 5**). It is also operational through elastic process automation and optimal for intelligence-driven decision making for Business, Education and Entertainment (iBEE), which is the highlight in terms of major contributions of CMD triad to orchestrate Anything-as-a-Service (XaaS), applicable for iBEE.

"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.

4.3. Educational Excellence via Comprehensive Engagement in Learning

Educational excellence via comprehensive engagement in learning (EXCEL) is considerably a specialized "business" that helps to excel education for student success. In particular, when a courseware is prepared and published as an online service, lots of things would be considered as intelligence to assist an instructor 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 will help to reflect EXCEL.

Educational excellence is strongly associated with CIA-directed courseware presentation [14] of Contextuality, Interactivity and Accessibility: spontaneous

contextuality in breadth, sequential interactivity in depth, and systematic accessibility in detail, which decisively promotes instructional engagement for student success, illustrated by **Figure 6**.

Figure 6 presents a CIA-directed courseware of intelligent service for educational excellence engaging for student success in a hybrid instructional approach through such processes as: 1) *spontaneous contextuality* that meets the needs of individuals to overview the content in breadth, 2) *sequential interactivity* that dedicates students through learning process (one after another), and 3) *systematic accessibility* that incorporates instruction advancement and engagement for student success with individual profiles of coursework.

Spontaneous contextuality is presented as a top-bar folder beneath which multiple aspects are organized in such a multiTab 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 timelinely 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".

Systematic accessibility acts as an intermediate media where all students have their own profile-boxes allowing individuals to prepare, present and publish their coursework according to the learning module. An instructor has the



Figure 6. CIA courseware for educational excellence via contextuality, interactivity and accessibility.

privilege to view, grade and interact with the individual in collaboration with the submitted coursework for reviewing and revision.

"CIA-directed" courseware embodies educational intelligence in support of hybrid learning and engaging for student success. It is via comprehensive engagement in learning that educational excellence in contextual spontaneity (eliminating monotony), interactive responsibility (promoting requesting & responsive), sustainable availability (accessible between instructor and student).

4.4. Entertaining (Netflix-Like) Reactivator

Entertaining reactivator basically acting like Netflix that offers a film and television series library through distribution deals as well as its own productions, ultimately archives 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, and hierarchy in depth may apply security level to manage and control accessibility for the commercial purpose. 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 7, as an example, illustrates an entertaining service of five categories, such as Comedy, Tragedy, Disaster, Cartoon, and Musical. They are initially well archived for self-paced preview for free if a user has not purchased anything. On the contrary, those five banners automatically turn 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.



Figure 7. netFlyer entertaining service for better experience via contextuality and interactivity.

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

Cloud archival repository express provides a fastlane to orchestrate Anything as a service through DATA publishing for online analytical processing and wiseCIO aggregating intelligence for business, education and entertainment (iBEE). Innovative online analytics via machine learning has emerged as illustrated in **Figure 4** in which machine learning plays a key role in automating elastic processes for business intelligence via online analytical processing to support decision making [1] [2] [3] [4] [7] [8] [9].

5. QUINARY XaaS via Web-Based Intelligent Service

QUINARY in general stands for a *queryable*, *usable*, *interactive*, *novel*, and *available* repository that supports human-computer interfacing based on integral content management over DATA. In particular, Quinary (five) little applications are orchestrated as anything as a service (XaaS) via the cloud archival repository of queryability, usability, interactivity and actionability.

Quinary applications utilize similar (close to be exactly same) algorithmic patterns [15] that drive machine learning automata for universal interface and user-centric experience without coding required. This indicates the great possibilities that (anything as) a service can be fulfilled by anyone who knows how to type in text in the input blanks, illustrated in **Figure 8**.

Quinary UI & UX represents the algorithmic interactivity for automated human-computer interfacing design Machine Learning automata (MLa), in which the UI Dictionary simplifies web development by only inputting Key-Value pairs (dictionary) that have nothing to do with HTML/CSS/JS, but "DNA-like" ingredients. The wise Dictionary is central to bridging between DATA and wiseCIO with machine learning rule assistance, MLa makes the wise Dictionary executable



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

(*on the client device*), retrievable (*from the remote server*), and convertible (*with UI Dictionary for the user to input with ease*).

Specified discussion will be conducted to take CARE of anything as a service.

5.1. Queryability: Word-Driven Aggregation

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

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.

The word-driven showcase serves with a heuristic wording guess, then engages the user to go further and in more depth, which becomes especially effective while exploring entertaining multimedia within a giant number of resources.

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

5.2. Usability: Digital Music Avocation in Composition

Digital music avocation plays a key part in fostering early-age musical education by recognizing music notes and fun music composition, which is helpful for a little kid to discover his/her talent in composing music. A user can compose a "song" by selecting and putting musical notes into a queue and he/she can also make chords by putting two or more musical notes into the same position in the queue so as to play at the same time. 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 can find their beloved who may have interest in music composition. A simple DIMa will do the trick on an iPAD. In general composability is a business principle that refers to the ability to combine modular business elements as needed [17] [18].

Composable Usability particularly embodies potential production or creation

of music, poetry, or formal writing. Composability via digital music aims to foster coding and creativity through music composition. Heuristically, a kid can try some pre-prepared musical songs, and based on which he can compose his own songs by adding chords (maybe weird or harmony) or replacing some key notes.

The digital music showcase provides a web-based keyboard for musical tasting by composing songs, or making chords with ease. The heuristic virtual piano (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 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 and allows 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 action to take.

An animation montage provides a way to control an animation asset that enables a combination of several different animation sequences into a single asset that you can break up into sections for playback [19]. The concept of animation 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 intelligent anything as a service), and the degree to which the exchange of information happens to control robots, robotic process automation, and so forth. Specifically, rich interactivity over a cloud-based intelligent service engages users with their exploration of entertaining services, instead of embodied with boredom.

Traditionally, a website on display is almost the same, then a user will have to scroll up/down to find a section of his/her interest. 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.

The 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 interest is really in.

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

5.4. Novelty: Programmable Assembled Computing Machinery

Actionable computing machinery assembly is to simulate coding in an assembly-like language in a visual approach. An instruction to encode an action is represented as a token consisting of at least three elements: 1) a number (code), 2) a wording description (action), and 3) a visual illustration, such as an animated Gif, a video, or audio. ACMa 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 ACMa can be written by coding instructions to be executable with visual illustrations rendered dynamically, so the execution of programs produces a cartoonish movie that is playable, programmable and presentable.

Programmable novelty 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 (two branches to choose one or the other) 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, executable and operational (selective). Furthermore, the user can enhance the existing instruction set, or create his own computing machinery with a new instruction set.

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

The assembled machinery service enables rapid prototyping and 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 customization to encourage the user 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 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 customer's particular needs. Customization pleasantly provides better user experience that encourages and engages a user with something new via cloud-based intelligent anything as a service. Generally, most websites start with a search, then a group of content to be offered for further explorations. However, a new hand user may have no clue about what to search and where to start. As initial heuristics, letters of the name are combined to bring out the customizable content for the user to get started with ease.

The 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 to responsive adjustment over multimedia grouping to accommodate a customer's particular needs for better user experience that encourages.

6. Conclusions

CARE—Cloud Archive Repository Express has emerged from algorithmic machine learning in collaboration with wiseCIO and DATA for an express or a "fast lane" is paved for *seamless* intercommunications and *semantic* enrichment among the three parties of CMD tiad that helps to achieve the following UNIQ objectives:

Ubiquitous manager is innovated ubiquitously across and cared-for CMD to *harness* information for business, education and entertainment (iBEE), and *propel* cohesive assemblies for anything as a service (XaaS) via interactive CMD as discussed in **Section 2**.

Novel designer takes CARE for universal interface design and user-centric experience by instant typing online publishing via express tokens for information interchange (eTokin) without explicitly coding required as deeply studied in **Section 3**.

Intelligent expert represents one of the CMD goals that help with decision-making by aggregating intelligence for business, education and entertainment (iBEE) where the CMD triad is collaborative with digital archiving and intelligent service as presented in **Section 4**.

Quinary liaison liaises with human-computer interfacing via eTokin that simplifies collaborative communications without rendering related redundancies, but semantic enrichment via algorithmic machine learning does the trick to orchestrate Anything as a Service through robotic process automation as described in **Section 5**.

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

Novel triad provides innovative solutions to distributed and cloud-based problems and enables Anything 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 propels large teams united and working together effectively

and algorithmically with practical methods implemented as intelligent services, CMD triad 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.

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

In addition to feasible accomplishments, there will be more efforts to make as future work and practice:

1) **Machine learning rules** should be more active to prompt test-driven "sensors" to enable thorough analysis on eTokin for the sake of comprehensively semantic enrichment, instead of confused execution because of highly-express (too brief?) tokens for information interchange;

2) 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;

3) **More thorough work** will be conducted on algorithmic sophistication to enhance computing abilities to machine learning to minimize explicitly coding through robotic process automation;

4) **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.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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