


N²ICT-CIO: Clinical Informatics Outlet via Neural Networks for Inclusive, Contextual, and Tractable eHealth

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Keywords: CIO-Clinical Informatics Outlet, OLAP-Online Archival Analytical Processing, CARE - Cloud Archival Repository Express, DATA - Digital Archiving & Transformed Analytics, UnIX-Universal Interface & User-Centered experience.


Abstract: Studies on Ageing Well and eHealth aim to improve health-related quality for well being life in AWE that applies Information & Communication Technologies to Clinical Informatics as Outlets to help people stay healthier, and more independent and active at work or in their community. The Clinical Informatics Outlet has emerged from information-driven technologies in which the neural network plays a key role in applied artificial intelligence and machine learning (AIM) for the effective use of information and data technology in healthcare to improve patient outcomes, streamline clinical workflows, and enhance the delivery of care. This paper presents N²ICT-CIO acting as a clinical informatics outlet (platform) that aims for the use of digital technologies and electronic communication tools to support and improve healthcare services with inclusivity, contextuality and tractability. Where the ICT can be redefined from a service perspective via AIM and Neural Networks characterized through *inclusivity* via inclusive design for equitable services that are accessible, usable, and enjoyable; *contextuality* for charming user experience in a contextual, individual and assemblable approach to help other people consider something in its context; and *tractability* is to propel handlings of situations with ease. The novel CIO (N²ICT-CIO) represents a revolutionary step forward in healthcare delivery, leveraging advanced technologies. Designed to address inefficiencies, improve patient portfolio, and enhance security and collaboration across healthcare systems, it can be built as a cohesive platform able & capable to integrate these technologies around core pillars: neural networks, universal interactivity, resilient enhancement, and self-adaptive automation (Magic G.I.F.T). As a result, N²ICT-CIO, based on the previous inventive work of wiseCIO, prioritizes generative criteria for equity of eHealth service regardless of their abilities, such as age, background, or circumstances, contextualizes dynamical portfolio optimization to user-centered experience, and most important, synergizes CARE (for content management & delivery), DATA (for OLAP), and UnIX (universal interface & experience) as a whole to promote cloud-based orchestrated Anything-as-a-Service (XaaS) with Magic G.I.F.T characterized via dynamically Grouping, Indexing, Folding & Targeting for eHealth services available at the user's fingertips.

1 INTRODUCTION

Studies on Ageing Well and eHealth aim to improve health-related quality for well being life in AWE that apply Information & Communication Technologies to Clinical Informatics as Outlets to help people stay healthier, and more independent and active at work or in their community. The Clinical Informatics Outlet

has emerged from data-driven technologies in which the neural network plays a key role in applied artificial intelligence and machine learning (AIM) for the effective use of information and data technology in healthcare to improve patient outcomes, streamline clinical workflows, and enhance the delivery of care.

Inclusivity ~ Traditional systems design and development pursue a "one-size-fits-all" solution,

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** Henry's Interview on Digital Twin by Dr. Liang, <https://youtu.be/sbtWLMYsnU>

which is optimal and general, but may probably introduce unpredictable “digital biases” to the community-based diverse mass users - a specific group of people may feel biased because of various abilities, such as ages, backgrounds, and/or circumstances. More biases could be introduced by “sophisticated” design that may be stiff, and make users stuck without dynamical portfolio optimization (Gunjan and Bhattacharyya, 2022), such as linguistics in menu, layout for outcomes, the algorithmic processing approach, etc., which makes the user inconvenient, incapable, and inequitable while using them. The paper’s goal is to use neutral networks to make the hidden layer eclectic and turn out “smiley face” (without biasing anybody) in which personalized usage of the service would be dynamically as part of the input so as to rid digital biases. Innovation with artificial intelligence and machine learning (AIM) helps humanize eHealth services and turn “digital biases” into a “digital mentor” aligning with diverse individuals on their needs (Whitlow and Liang, 2024). Ideally, the inclusive “digital twin” is generalized by creating products, services, or environments that are accessible, usable, and enjoyable for as many people as possible, regardless of their abilities, such as age, background, or circumstances.

Contextuality ~ smart computing abilities are required to help other people consider something in its context or the situation within which it exists or happens. In favor of “multifacetedness-in-one”, or “multifacets-in-one”, systematic contextuality means understanding and embracing various facets, behaviors, or outcomes based on their interactions within a specific system or environment. It is systematic contextuality that helps the effective use of information and data technology in healthcare to improve patient outcomes, streamline clinical workflows, and enhance the delivery of care. On another hand, “digital biases” may not be so wrong, but could be “pre-planted” strategic decisions, systematic contextuality assists the “digital mentor” by providing multifaceted, eclectic and elastic scenarios for eHealth services.

Tractability ~ informative abilities are needed to effectively address, manage, and solve health-related problems or challenges. Ensuring tractability without biases means developing solutions that are accessible, fair, and effective for all patients, regardless of background, socio-economic status, or other individual factors. As part of clinical informatics outlets, informative tractability embodies data-driven decisions with diverse representation, transparency in methodology and outcomes, and the most important,

equitable access to treatment and resources that should be unbiased.

The novel CIO represents a revolutionary step forward as a Clinical Informative Outlet in healthcare, leveraging advanced technologies such as Artificial Intelligence & Machine learning (AIM), blockchain, cloud computing, big data analytics and neural networks, smart contracts, and digital twins (mentor to individuals). Designed to address inefficiencies, improve patient portfolio, and enhance security and collaboration across healthcare systems, it can be built as a cohesive platform able & capable to integrate these technologies around core pillars: neural networks, universal inclusivity for unbiased use with ease, resilient enhancement for contextualized user experience, informative tractability for accessibility, fairness, and effectiveness for all patients, and self-adaptive automation to promote cloud Anything-as-a-Service (XaaS) with Magic G.I.F. T (Liang and Miller, 2024) characterized via dynamic ally Grouping, Indexing, Folding & Targeting for eHealth available at the user’s fingertips.

From the view of AIM, to humanize eHealth services of inclusivity, contextuality and tractability, the N²ICT-CIO may involve two types of data sets that can be migrated as knowledgebase from experiential and expertise in the industrial sector: large datasets, and arbitrary & unstructured data streams that collaborate through CIIA (contextual, interoperable & intelligent aggregation) for clinical portfolio management. OLAP (Microsoft Azure Analysis Services, 2025) represents a category of data processing that enables users to perform complex archived analytical queries on large datasets quickly and interactively, which is widely used for business intelligence and decision support because it allows users to analyze data from multiple perspectives (such as time, location, and product) by structuring it into multi-dimensional “cubes.” Neural Networks are used to deal with arbitrary or unstructured data that are strongly associated with portfolio content normalization and optimization. They can also innovate with traditional existing websites to be more presentable to help ensure user-centered experience in the cloud computing environment with low/no coding.

Strategic Impact ~ the N²ICT-CIO platform offers a transformative approach to healthcare, addressing key challenges such as data fragmentation, administrative inefficiencies, and lack of personalized care. By integrating AIM, blockchain, cloud computing, and other technologies, it enables healthcare providers to deliver efficient,

secure, and patient-centered care. Major contribution of the paper on the self-adaptive CIO eclectically & elastically combs OLAP with Neural Networks to considerably aim for Inclusive, Contextual, and Tractable eHealth, all of which is reflected with following benefits:

- **Personalized, Real-Time Care:** AI-driven insights and adaptive learning enable healthcare providers to tailor treatments to individual patient needs, improving accuracy and outcomes.
- **Secure and Transparent Data:** Blockchain ensures the privacy and security of patient data while enabling transparent and trusted sharing among healthcare stakeholders.
- **Automation and Efficiency:** The use of smart contracts automates administrative tasks, reducing the burden on healthcare providers and streamlining patient interactions with healthcare systems.
- **Collaboration and Scalability:** Cloud computing facilitates collaboration between healthcare professionals, supporting the integration of diverse care providers and ensuring that patient care is coordinated across multiple settings.
- **Proactive Healthcare Delivery:** Predictive analytics powered by big data allows for early identification of health risks, enabling healthcare systems to move from reactive care to proactive, preventive care.

The paper is organized with following aspects:

Sec-2. Overview of N²ICT-CIO

Sec-3. Pillars for Clinical Informatics Outlet

Sec-4. RNNs for contextual enhancement

Sec-5. Case Study for better Applied Outcomes

Lastly, the conclusion will be drawn to summarize.

2 OVERVIEW OF N²ICT-CIO

N²ICT-CIO addresses key challenges such as data fragmentation, administrative inefficiencies, and lack of personalized care, functions as the clinical informatics outlet, a cloud-based platform that considerably offers “digital & clinical mentorship through a transformative approach toward Inclusive, Contextual, and Tractable eHealth. It is the novel CIO platform that enables healthcare providers to deliver

efficient, secure, and patient-centered care by integrating AIM, blockchain, cloud computing, distributed data center, and other technologies, illustrated in **Figure 1**.

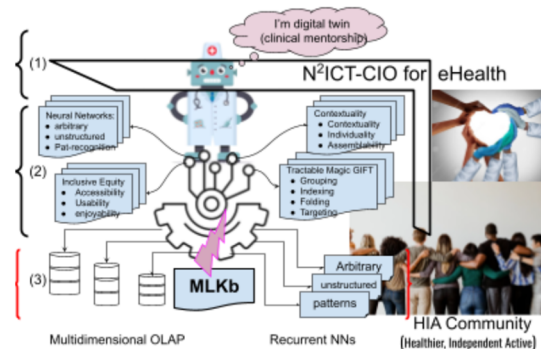


Figure 1: Clinical Information Outlet for eHealth.

According to **Figure 1**, The N²ICT-CIO serving as a clinical informatic outlet platform for eHealth can be modeled in a three-layered framework: 1) digital clinical mentorship, or digital twins - a virtual replicas of patients, liaising with human serving for the HIA community; 2) the central gear represents AIM embodied via information-driven eclectic automata (Liang and Miller, 2024) endorsed by MLKb, so that patient-centered care can be offered via ICT characterizes Inclusivity, Contextuality, and Tractability achievable by Neural Networks for high flexibility & adaptability; 3) two types of distributed resources utilized for iDEA: the domain-specific data sets via OLAP, and arbitrary data streams via RNNs (Stryker, C. IBM, 2025). eHealth promises a digital revolution for better care by effective use of information and data technology in healthcare to improve patient outcomes, streamline clinical workflows, and enhance the delivery of care.

A multi-document represents functional features the CIO pursues, and Recurrent Neural Networks (RNNs) denote a deep neural network trained on sequential or time series data to create a machine learning (ML) model that can make sequential predictions or conclusions based on. MLKb plays a key role in both OLAP and RNNs through data mining, analytical processing, information retrieval, and pattern recognition. MLKb supports robotics automation with low or no coding.

2.1 The Future of eHealth: A Digital Revolution for Better Care

As we stand on the brink of a technological renaissance in healthcare, eHealth emerges as a

transformative force poised to revolutionize how care is delivered, accessed, and experienced. With advances in digital twins, artificial intelligence (AI), blockchain, cloud computing, and machine learning, we are entering an era where healthcare becomes not only more efficient but also more inclusive, personalized, and proactive. The N²ICT-CIO could be a domain-specific CIO (clinical informatics outlet), a digital revolution for better care, and helps to lead to the future of eHealth as follows:

- **A New Era of Inclusivity and Personalization ~** One of the most promising aspects of eHealth is its ability to make care equitable and adaptive. For too long, healthcare has struggled with disparities based on geography, socio-economic status, and systemic inefficiencies. But imagine a world where digital twins—virtual replicas of patients—enable personalized care plans that adapt dynamically to an individual's unique needs. These digital models, combined with AI, offer unprecedented opportunities to predict outcomes, optimize treatments, and prevent complications.
- **The Power of Collaboration and Real-Time Insights ~** Healthcare has long been hindered by data silos and fragmented systems. However, platforms like the N²ICT-CIO offer a glimpse into a future where collaboration becomes seamless. By integrating blockchain for secure data sharing and cloud computing for real-time accessibility, these platforms enable physicians, specialists, and caregivers to work together as never before.
- **Empowering Aging Populations ~** The challenge of caring for aging populations is one of the 21st century's defining healthcare issues. eHealth technologies are uniquely positioned to address this challenge. IoT devices, such as wearables, continuously monitor vital signs, mobility, and other health indicators, feeding data into AI-powered systems that predict and prevent potential emergencies.

2.2 Digital CARE for eHealth

As an example of a previous inventive work, wiseCIO (Liang, Lebby and McCarthy, June, 2020) has embraced a good number of dedicated and intelligent parts for industrialized content management and considerate delivery ("CMD"), such as CARE for well-archived content management and delivery, MLKb for algorithmic machine learning that implements data mining of arbitrary / unstructured

data streams via pattern recognition, DATA for digital archiving & transformed analytics.

N²ICT-CIO platform considerably offers a transformative approach to Inclusive, Contextual, and Tractable eHealth by addressing key challenges such as data fragmentation, administrative inefficiencies, and lack of personalized care. Central to the N²ICT-CIO platform is (a) DCM (digital-clinical mentorship) being grounded on (b) MLKb with AIM to embrace (c) RNNs (for deep learning from unstructured data streams) and (d) OLAP (for digitally-archived data sets). The DCM via Clinical Informatics Outlet coordinates the N²ICT of Inclusivity, Contextuality, and Tractability in support of the HIA Community that is healthier, independent and Active, mentors patients and clinical staff members in healthcare to improve patient outcomes, streamline clinical workflows, and enhance the delivery of care, and discoveries their behavioral preference, and care-specific routines for the sake of better mentorship. In particular, the N²ICT platform is open to orchestrate Anything-as-a-Service with AIM that assembles various technologies, such as blockchain, cloud computing, and other technologie, with low or no coding, for healthcare providers are enabled to deliver efficient, secure, and patient-centered care.

2.3 Core Pillars of CARE for eHealth

There are following pillars that make the Clinical Informatics Outlet transformative to Inclusive, Contextual, and Tractable eHealth as follows:

- **Inclusive Digital Twins via DCM** (digital-clinical mentorship) as virtual replicas of patients to liaise inclusively with eHealth service for the HIA community. Wherein portfolio normalizer via MLKb to embrace AIM to synergize dynamical portfolio optimization as a powerful strategy for maximizing customer value, improving customer satisfaction, and driving profitability.
- **Contextual Collaborator** for digitally-archived data sets able to contextualize current technologies, such as blockchain, big data analytics (OLAP) and neural networks (RNNs), smart contracts, together with previous inventive works residing on wiseCIO (Liang, Lebby and McCarthy, 2020), such as CARE (Liang, Hall, Pogge and Van Str, y 2022), DATA (Liang, McCarthy and Van Stry, 2021), and UnIX as dedicated parts from which N²ICT-CIO is composed as a whole for Clinical

Informatics Outlet through Orchestrated XaaS for Inclusivity, contextuality tractability by harnessing cloud-based Anything-as-a-Service (XaaS) for a wide range of service delivery over the internet rather than through traditional means.

- Tractable Allowance-Made-For the HIA Community & eHealth via information-driven elastic automata (iDEA) to tractably collect workflows of tasks that are eclectic & elastic to the individuals, and target via Magic G.I.F.T

Among inclusivity, contextuality, and tractability, portfolio normalization transitions from inclusivity to contextuality, and orchestrated XaaS from contextuality to tractability. Thorough discussions will be conducted in the next section.

3 CORE PILLARS FOR CLINICAL INFORMATICS OUTLET

The clinical informatics outlet (CIO) emerges from eclectic and elastic cloud archival repository express (CARE) in combination with OLAP and RNNs as a whole for inclusive, contextual, and tractable eHealth. There are five core pillars that streamline via iDEA the effective use of information and data technology in healthcare to improve patient outcomes, harness clinical workflows, and enhance the delivery of care, as illustrated as **Figure 2**.

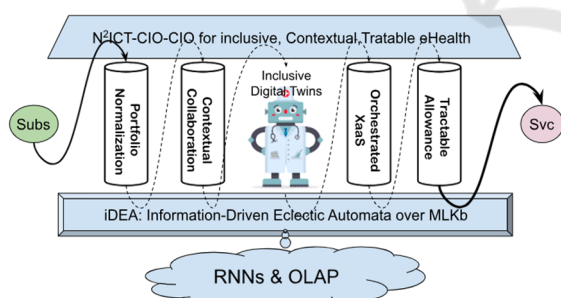


Figure 2: iDEA: information-driven Eclectic Automata.

According to **Figure 2**, it is depicted that the neural network is made robotic consisting of layers of nodes, or artificial neurons. The subscribers (Subs), such as patients and medical providers, liaise with the input layer (portfolio) through several hidden layers, such as Contextual Collaboration, Digital Twins, and Orchestrated XaaS, and the output layer Tractable Allowance made for eHealth services (Svc). Central to the network is Inclusive digital twins that are

virtual replicas of patients to liaise with eHealth service for the HIA community. Each pillar acting as a node connects to others, and has its own associated “weight” and “threshold” throughout iDEA that refers to the MLKb via OLAP and RNNs. If the output of any individual node within the pillar is above the specific threshold value that node is activated, sending data to the next pillar of the network. Otherwise, no data is passed along to the next pillar of the network.

3.1 Intelligent & Optimal CIO

Intelligent and optimal CIO - clinical informatics outlet - can actually provide virtual replicas of patients that are responsible to liaise inclusively with eHealth service for individual members of the HIA community. One of the most promising aspects of eHealth is its ability to make care equitable and adaptive. For too long, healthcare has struggled with disparities based on geography, socio-economic status, and systemic inefficiencies. But imagine a world where digital twins enable personalized care plans that adapt dynamically to an individual’s unique needs. These digital models, combined with AI, offer unprecedented opportunities to predict outcomes, optimize treatments, and prevent complications.

For example, an elderly patient with multiple chronic conditions can benefit from a digital twin that simulates the effects of various treatment options. This allows clinicians to choose the safest and most effective path, reducing hospitalizations and enhancing quality of life. This technology also democratizes care, ensuring that rural and underserved populations gain access to the same high-quality healthcare as those in urban centers.

3.2 Rule-Based CIO via Portfolio Normalization

Portfolio normalization innovates to normalize and synergizes dynamic portfolio optimization that supports comfortable and trustful eHealth service through the “digital mentorship” that can be individualized as a powerful strategy for maximizing customer value, improving customer satisfaction, and driving profitability. Portfolio is a collection of drawings, documents, etc. that represent a person's work and tracks, such as clinical workflow, historical prescriptions and so on. The PON helps the service get smarter through Algorithmic machine learning. With PON the learning process can get rid of GIGO, or garbage-in-garbage-out.

3.3 Collaborative CIO with Interoperability

The collaborative CIO is empowered by Collaboration and Real-Time Insights. Healthcare has long been hindered by data silos and fragmented systems. However, platforms like the N²ICT-CIO offer a glimpse into a future where collaboration becomes seamless. By integrating blockchain for secure data sharing and cloud computing for real-time accessibility, these platforms enable physicians, specialists, and caregivers to work together as never before.

Picture a global network where a general practitioner in Atlanta can consult with a specialist in Geneva in real-time, sharing patient data securely and instantly. This interconnected ecosystem is not only a boon for individual patients but also a game-changer for tackling global health crises, enabling faster, data-driven responses to pandemics, and resource shortages.

3.4 Orchestrated CIO Empowering Aging Populations

The challenge of caring for aging populations is one of the 21st century's defining healthcare issues. eHealth technologies are uniquely positioned to address this challenge. IoT devices, such as wearables, continuously monitor vital signs, mobility, and other health indicators, feeding data into AI-powered systems that predict and prevent potential emergencies.

Meanwhile, telemedicine, bolstered by the Anything-as-a-Service (XaaS) model, brings care to patients wherever they are. An elderly individual can consult a doctor from the comfort of their home, supported by real-time data insights and secure digital records. This integration of technology enhances independence and dignity for aging individuals while easing the burden on caregivers.

3.5 Tractable CIO Making Allowance for Digital Innovation

Tractable CIO represents iDEA the collected workflows of tasks will be eclectic to the individuals, which acts as the DCM. It is the iDEA whose core is digital innovation that helps with the effective use of information and data technology in healthcare to improve patient outcomes, streamline clinical workflows, and enhance the delivery of care. Let's imagine, there are a certain number of tasks in clinical services, the combinational would be huge against

individuals. Here not pursuing "one-size-fits-all" solution that could bring out "digital biases", We are, instead, promoting "multifaceted-in-one" in individual "digital mentorship" with inclusivity. The clinical workflows can be streamlined according to individuals' special needs. Magic G.I.F.T is considered a great AI tool in e-service digital innovation with plenty of content deliverable dynamically through Grouping, Indexing, Folding & Targeting for eHealth services available at the user's fingertips.

As we stand on the brink of a technological renaissance in healthcare, eHealth emerges as a transformative force poised to revolutionize how care is delivered, accessed, and experienced. With advances in digital twins, artificial intelligence (AI), blockchain, cloud computing, and machine learning, we are entering an era where healthcare becomes not only more efficient but also more inclusive, personalized, and proactive.

4 NEURAL NETWORKS FOR CONTEXTUAL ENHANCEMENT

A neural network is a machine learning model that makes decisions in a manner similar to the human brain, by using processes that mimic the way biological neurons work together to identify phenomena, weigh options and arrive at conclusions.

Specifically neural Networks are introduced to deal with arbitrary or unstructured data streams that are strongly associated with portfolio content normalization and optimization via CIIA (contextual, interoperable & intelligent aggregation). They can also innovate with traditional existing websites to be more presentable, so that "CIIA" helps ensure user-centered experience in the cloud computing environment with low coding or no coding. Contextuality is derived from the subscribed portfolio about user experience under a specific circumstance where the user's focus would be. That is, the circumstance is "renovated" for individuals without appearing with the same interfacing content to cause the loss of his focus / concerns.

4.1 Eclectic Collaborative CMD

Collaborative Content Management & Considerate Delivery (CMD) could only be achieved via neural networks. Considerate delivery to the individuals should be inclusive without digital biases. So we

introduce Recurrent Neural Networks (RNNs, Stryker, C. IBM, 2025) as an eclectic and elastic solution to CMD. RNNs denote a deep neural network trained on sequential or time series data to create a machine learning (ML) model that can make sequential predictions or conclusions based on It makes sense with RNNs that sequential inputs from the given subscriber can assist sequential predictions or conclusions.

The neural network is made robotic consisting of layers of nodes, or artificial neurons. The subscribers (Subs), such as patients and medical providers, liaise with the input layer (portfolio) through several hidden layers, and the output layer for eHealth services (Svc). Each node acting as a node connects to others, and has its own associated “weight” and “threshold” throughout iDEA that refers to the MLKb via OLAP and RNNs. If the output of any individual node is above the specific threshold value that node is activated, sending data to the next pillar of the network. Otherwise, no data is passed along to the next pillar of the network.

MLKb plays a key role in both OLAP and RNNs through data mining, analytical processing, information retrieval, and pattern recognition. MLKb supports robotics automation with low or no coding, as illustrated in **Figure 3**.

Figure 3 shows you the subscribers (Subs as input), and the eHealth service (Svc as output), and in between is the processing (hidden) layer where neutral networks are built based on dynamically-normalized portfolio. There are various computing approaches toward the implementation of portfolio optimization. The solution to the N²ICT-CIO platform is the MLKb (machine learning knowledgebase) that intelligently supports and generates contextual neural networks with low/no coding. That is to say, the “pathway” as indicated above for an individual, is intelligent for reasoning-about.

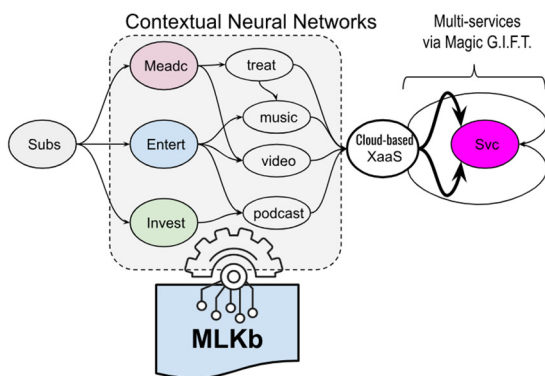


Figure 3: Contextual neural networks for user experience.

Amazingly, the customizable context through contextual neural networks would prioritize the primary on top at user’s fingertips, and in the meantime, a group of associative content is suggested available and accessible at the most convenience. According to iDEAL-CIO (Liang and Miller, 2024), a “magic lamp” is provided with hundreds up to thousands web blocks that can be made available and accessible in the context, which is enabled with Magic G.I.F.T. for top presentation of the web block plus dynamically grouping, indexing, folding and targeting through associative accessibilities.

4.2 Descriptive RNNs with Low Coding

Descriptive RNNs support rule-based Machine Learning automata so that the RNNs can be implemented recurrently with dynamic rule distribution to drive the automata. Descriptive RNNs are composable for iDEA that signals divergent nodes connecting each other lead to “sinking output”, one or zero outlet. The descriptive RNNs can strategically be fulfilled through structurality, spontaneity, smoothness and synthetics as a JIT (Just-in-Time) output. A variety of means by which the inclusive section via the clinical informatics outlet is to be composed and delivered from the collective portfolio segments at runtime. For example, a clinical module can comprise sections, sessions, and (hierarchical) segments. Adherence to composable rules as constituents within an expert system (Parente, Rizzuti and Trerotola, 2025) serve to cohere or “glue” them under the module.

- Segment = sections in sequence: $S_1 \{ \& \} S_2$ // perform one after another
- ◇ Segment = sessions in selection: $S_1 \{ \} S_2$ // perform one or the other
- △ Segment = subordinate seg in logic: $S_1 \{ \& \} S_2$ // perform logically, but no order
- ⊗ Segment = subordinate seg in mixture: $(S_1 \{ \& \} S_2) \{ \} (S_3 \{ \& \} S_4)$

Figure 4: Rule-based descriptive knowledge for RNNs.

Figure 4 gives four definitions to neural logic flows that can be implemented as semantic graph in the MLKb:

- Logical sequence ~ in a given neural network, a node connects to another, the performing logic is from one to another, which could be understood in clinical treatments, intake of pills, then monitor
- Logical selection ~ a node selectively connects to more than one node, but the performing logic is randomly selective, which could be understood in choice meals in a hospital.
- Logical at simultaneousness ~ a node connects multiple nodes and performs logic to transition

from the current to all the adjacent nodes at exactly the same time, but there must be a merging point, whoever researches at the point first causes others to cancel with no data.

- Logical Composite ~combinational priority.

With imaginary diagrams in **Figure 3**, the contextual neural networks can be described in above mentioned descriptive RNNs

4.3 iDEA over Descriptive RNNs

We have created an iDEA(Liang, and Cox, 2024) by using instructional information to drive an eclectic automata for diverse learners. The smart use of plenty of inclusive learning sections as neural network nodes generates three levels of learning modules: initial junior, senior. The sampled portfolio factors do help with the hidden processing layer in the RNNs. When each learning section is assigned with a value that marks as initial, junior and senior, etc. It was a work in progress for educational equity, but we can adapt the model here for N²ICT-CIO for eHealth service.

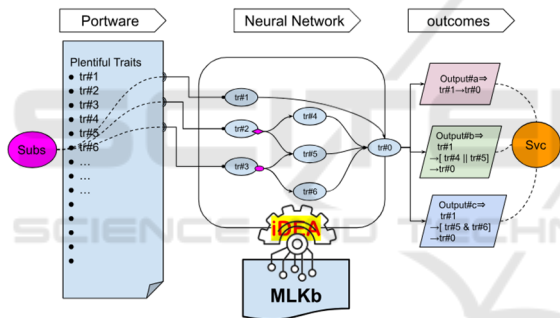


Figure 4: RNNs via info-Driven Elastic Automata.

In Figure 4, it is illustrated that the fulfillment of N²ICT-CIO is composed of four parts: portware, descriptive neutral network, diverse outcomes, and iDEA through MLKb. In a domain-specific field, there is generally a complete closure from a mathematical perspective, for instance, a complete closure for human marriages is [male, female] traditionally. 1) Portware is defined as the “complete closure” for eHealth affairs related portfolio components, such as patient outcomes, streamlined clinical workflows, and enhanced delivery of care, etc. where the “complete closure” is relatively complete but it could be enhanced, just like same-sex marriages, ...2) descriptive neural networks, reflecting combinatorial possibilities, in order to target inclusivity, ... 3) diverse outcomes against individuals’ needs, and 4) info-driven eclectic automata over MLKb.

4.4 Innovative eHealth for Portware

The innovative eHealth represents an approach on re-engineering traditional existing web content done for years, which turns out as associative, useful and usable with algorithmic machine learning in low or no coding. The idea of eHealth Digital Innovation is to innovate with or renovate the traditionally existing healthcare related websites by retrieving content in support of clinical informatics outlets (CIO). A piece of Portare, known as portBox (portfolio box), generally consists of an image (as an icon), a caption, and brief description, and a URL beneath that to access the original website, shown as below **Figure 5**.

As part of portfolio normalization, a portBox is innovated from existing websites (wiseCIO-renovated TeV, 2022; Hatfield , 2023) and automata beneath is the solution of RNNs describable with MLKb. There are charming intelligent features that can be automated and attached to the portBox, such as language set for auto-translation (via a dropdown list).



Figure 5: Innovated prtBoxes from existing websites.

Table 1: Descriptive RNNs for pattern recognition.

Explaining	Descriptive RNNs in MLKb
A useful icon / image could be tag , so by its src, the icon can be extracted for portBax. There may be multiple paths to succeed with a retrieval. ...	<pre>'website...': { // j=-hcc/tlnz 'pic': "icon-path>img:>src[] p2[] p3" ',clk': "url-path>a :>href [] p2 [] p3" ',cap': "cap-path>h2:>text()[]path" ',des': "desc-path > p :>text()" };</pre>

Machine Learning Knowledge (MLK) represents the possible highlights of RNNs (over arbitrary data streams) applied to eHealth Digital Innovation through iDEA, robotic processing automation. Following table is used to describe the RNNs for deep learning, and drive pattern recognition to retrieve core ingredients for protBoxes (icon, desc, url, caption, etc.):

Ideally, if some informative ingredients could be figured out through simplified NLP(Stryker and Holdsworth, IBM; DeepLearning.AI, 2023), such as categories, series, authors, or something as collectives, Magic G.I.F.T. can apply for rapid lookup

and precise access via dynamically Grouping, Indexing, Folding, and Targeting, which offers a user-centered experience with no coding at all. We will discuss it in the section of Case Study.

5 CASE STUDY FOR BETTER OUTCOMES

Applied Clinical Informatics Outlet comes out from the N²ICT whose back sketch is: Interactivity, Contextuality and Tractability as a whole in support of quality of eHealth service.

The eHealth can be made as an intelligent CIO via ICT, or digital twins along with Just-in-Time magic G.I.F.T. as shown in Figure 6. The objective of eHealth is information / intelligence and the means of better service is enable including inclusivity, contextuality, and tractability by applying artificial intelligence and machine learning (AIM) for the effective use of information and data technology in healthcare to improve patient outcomes, streamline clinical workflows, and enhance the delivery of care.

As the case study, we are to present four categorized intelligent features, different from traditional websites, such as dashboard, locator, grouping, and folding, all of which are low coding or no coding because of iDEA: information-driven eclectic automata.

5.1 Context-Sensitive Dashboard

Layouts of rich web content usually consist of multiple parts, so a heading bar is presented as the top menu whose items may include a sub-menu. When so many parts are presented, it would confuse the user unless he is so used to it. A big drawback is that any changes of menu items would mess up the user's ability to find the right entries for his further operation. With well categorized services, there is no need for a menu to appear on the webpages, but a dynamic dashboard is provided to track the user's interest while she / he goes into the category, for instance, music, science, arts, ... etc.

Context-sensitive dashboard is intelligently tracking the path that the individual user went into a category. With or without appearing onto a dynamic dashboard, a part tracks on statistical popularity. For more information, please refer to UnIX-CARE(Liang, Van Stry, and Liu, 2022).

5.2 Rapid Locator with no Scrolling

There is usually a lengthy list for web blocks (portBox) after being renovated from the original websites, and each block includes an illustrative image, a title, and brief description and associated actionable buttons, or anchors. Traditionally, a user can scroll down / up the listed web blocks, a "quick pickup" dropdown is of great help as part of the automated contextual locator.

The TeVA, Tennessee Virtual Archive has been highly praised with high professional and diligent work on. The renovated outcomes are even greater than the original website because of the excellence of UnIX. Amazingly, a user can stay without needing to swap webpages from one to another, which reflects what it means "centeredness of user experience". Also, such kind of valuable long-term information service could be more globalized with multi-linguistic translations, from which, contextuality really means what it does for better web service (e.g., healthcare) outcomes.

5.3 Keyword-Grouped Activator

Lots of long-term websites provide wonderful online resources (and we believe some in the healthcare field), however, the traditional organization strategy applied to organizing complex information services that make rapid access impossible because of an ideal number of items are allowed in the layout so the numbered pages from tens up to hundreds are used to manage big amount of web content blocks. Similarly, the websites can be renovated through algorithmic machine learning to collect all the blocks onto a single webpage, and each block includes an illustrative image, a title, and brief description and associated actionable buttons, or anchors. Traditionally, a user can scroll down / up the listed web blocks, but what if the number of blocks is up to 800. Magic GIFT has introduced grouping for better services dynamically.

Renovated by wiseCIO, the number of web blocks up to hundreds is still a big problem. The keyword-categorized grouping activator offers magic GIFT, a dynamic strategy to make dynamic groupings at user's fingertips (Hatfield, 2023).

By pattern recognition, there are several keyword based activators that allow dynamical grouping alternatively, such as *image-basis* (the same image indicating the series of the topic), *subject-basis* (the same subject may have multiple sessions), *speaker/host-basis* (speaker on topics or subjects), *associative topics* (similar topics as recommended), and *search-basis* (keyword to group).

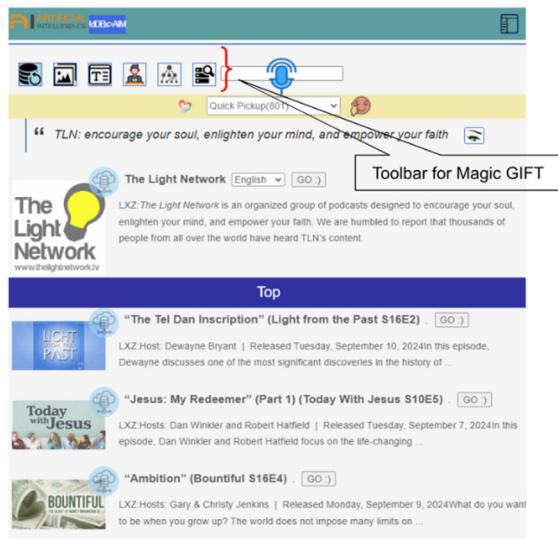


Figure 6: Dynamic button set for Magic G.I.F.T.

As shown in **Figure 6**, Applying “Topic-basis” to the originally collected up to 800 blocks, it turns out with Magic GIFT to form 25 groups of the same topics, which really can help users to see more (by collecting all from hundreds of webpages), and choose only a few (his interest within some topics). More details can be found in iDEAL-CIO.

5.4 Dynamic Folding to Dedicate Users

As a companion to the keyword-categorized grouping operation, Magic GIFT is applied to promote keyword grouping (say, topic-basis) and will present all the grouped blocks within a folder. A user, if his interest in that folder, can be contextually concentrated in his category without swapping even a single webpage.

The “just-in-time” activator for Magic GIFT offers not just lookup (prompted by some hints), but presents look-down (information-driven processing) within specific folders so that he can really experience what he is interested in, and he can eclectically get his needs to be met.

6 CONCLUSION

N²ICT-CIO sets a new standard for the future of healthcare by combining cutting-edge technologies into an integrated platform that addresses the evolving needs of healthcare providers and patients alike. By embracing personalization, security, efficiency, and collaboration, the platform positions

itself as a crucial enabler of smart healthcare systems globally. As eHealth systems face increasing pressure to innovate and improve outcomes, Clinical Informatics Outlet (CIO) offers a path forward through a data-driven, patient-centric, and automated approach to care.

Five pillars have been more or less in practice with plentiful web content blocks from the renovated traditional websites, industrialized content management & delivery, so the platform can be grounded up to be able to considerably orchestrate and capable of synergizing Anything as a Service (XaaS) through intelligent connectivity and interactivity. The N²ICT-CIO is positioned as a technology-driven ecosystem that aims to empower aspiring people in communities and regions, and nation-wide with the skills, resources, and networks needed to build individuals' entrepreneurial, professional and educational success.

6.1 Strategic Impact

The N²ICT-CIO platform offers a transformative approach to healthcare, addressing key challenges such as data fragmentation, administrative inefficiencies, and lack of personalized care. By integrating AI, blockchain, cloud computing, and other technologies, it enables healthcare providers to deliver efficient, secure, and patient-centered care (Whitlow and Liang, 2024).

The platform's adaptability makes it well-suited for diverse healthcare environments—from large hospitals to telemedicine networks—providing a scalable solution that is both cost-effective and capable of meeting the growing demand for data-driven healthcare services. Additionally, the platform supports healthcare systems in achieving greater transparency, operational efficiency, and collaboration across disciplines, fostering a new era of digital healthcare.

What has been achieved (?): wiseCIO was invented in Vancouver, Canada, and it was firstly presented at the Computing Conference, London, UK, July, 2020 aiming for universal interface & user-centered experience with low coding for industrialized content publishing (quick, precise, and instant); DATA was established by preparing complex content with digital archive, and intelligent connectivity promoted via analytical processing, Magic GIFT was introduced for large-scale website renovation, UniX-CARE was thoroughly developed for digital innovation on digital libraries, iDEAL-CIO was inspired for educational equity through advanced distributed learning.

How to transition successes from productive CMD to eHealth service (?): Content Management & Delivery needs to collect more materials to enrich the content for Healthcare outcomes; how to tie the individual users' feedback, and normalize it into the MLKB so that individual's experience can be customized and individualized, which would be a big part of the N²ICT-CIO.

To conclude, N²ICT-CIO sets a new standard for the future of healthcare by combining cutting-edge technologies into an integrated platform by embracing personalization, security, efficiency, and collaboration, the platform positions itself as a crucial enabler of smart healthcare systems globally. As healthcare systems face increasing pressure to innovate and improve outcomes, N²ICT-CIO offers a path forward through a data-driven, patient-centric, and automated approach to care.

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