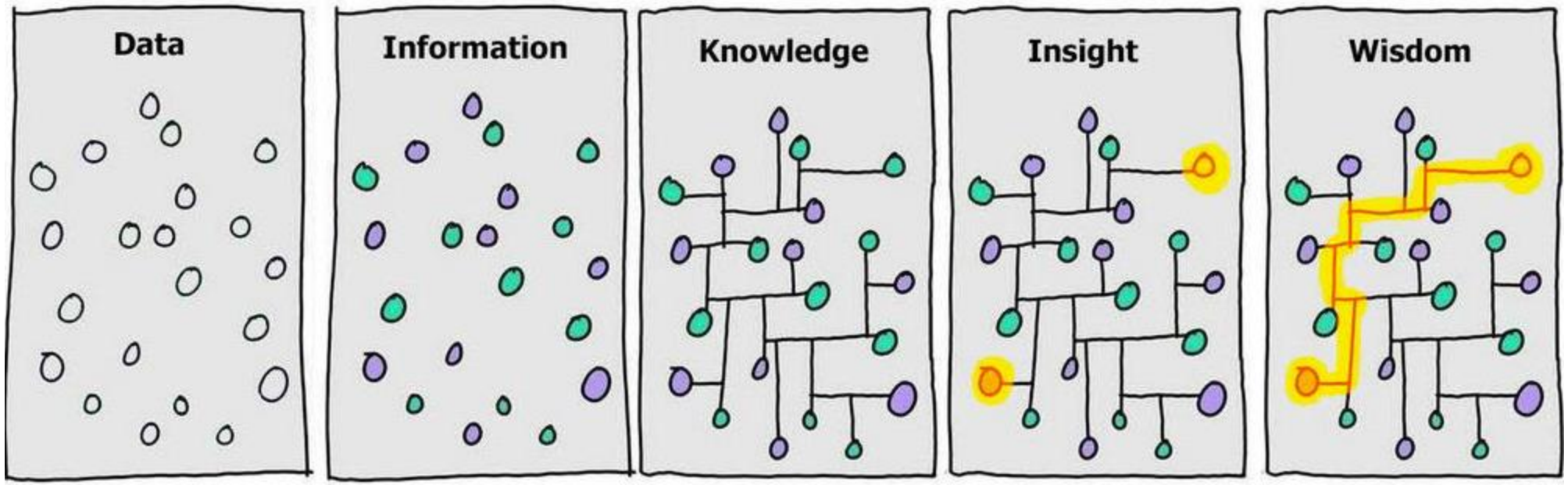
Informatics

Information Science

Charles Hoffman, CPA (Brainstorming)

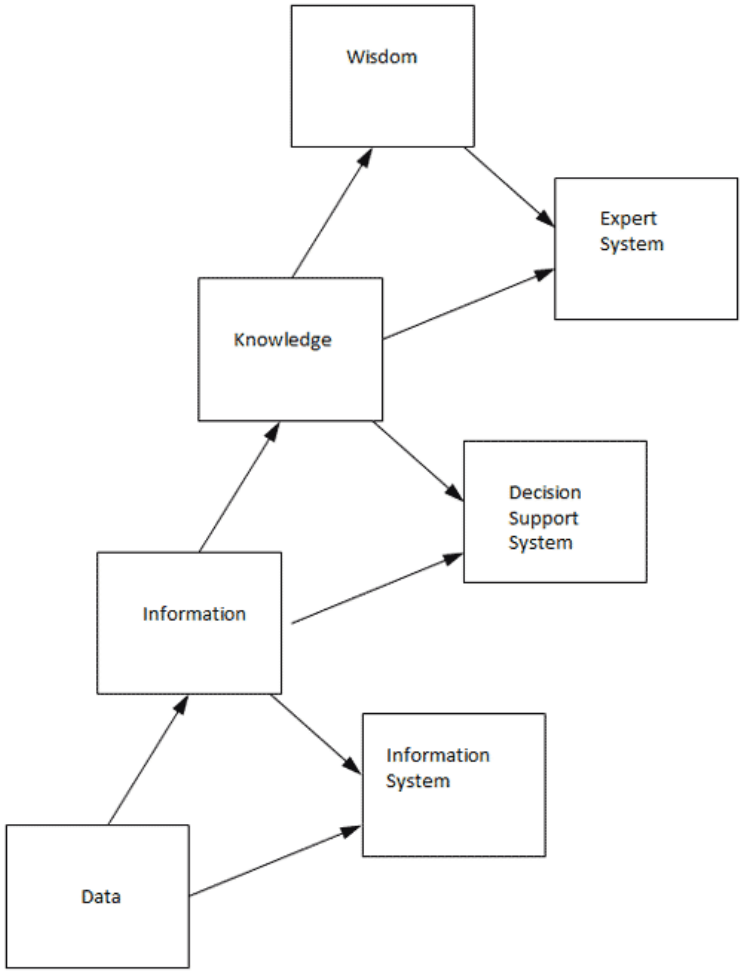
Data, Information, Knowledge, Insight, Wisdom

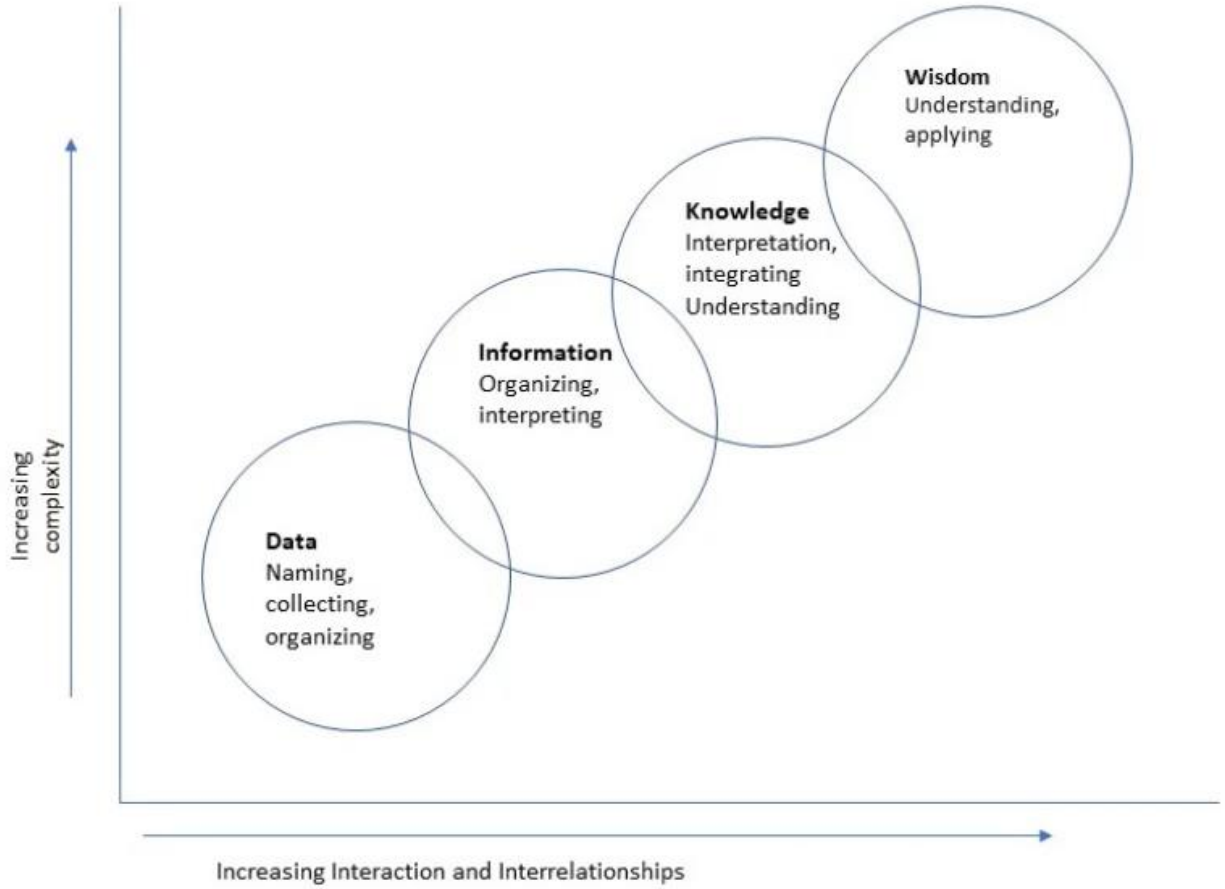


Data, Information, Knowledge, Insight, Wisdom

- **Data**: raw, unprocessed, uninterpreted items; tends to be understandable only in one local context which tends to be assumed
- **Information**: data that has been processed and organized to some extent and provided in some explicit context
- **Knowledge**: refined and actionable information that has been further processed, organized making the information super-useful
- ***Insight****: something learned about the information and knowledge available; a new realization (i.e. the information was there, but the connection had not been recognized)*
- **Wisdom**: use of data, information, knowledge and insight in making decisions or taking action; insight and wisdom come from applying knowledge to some specific situation.

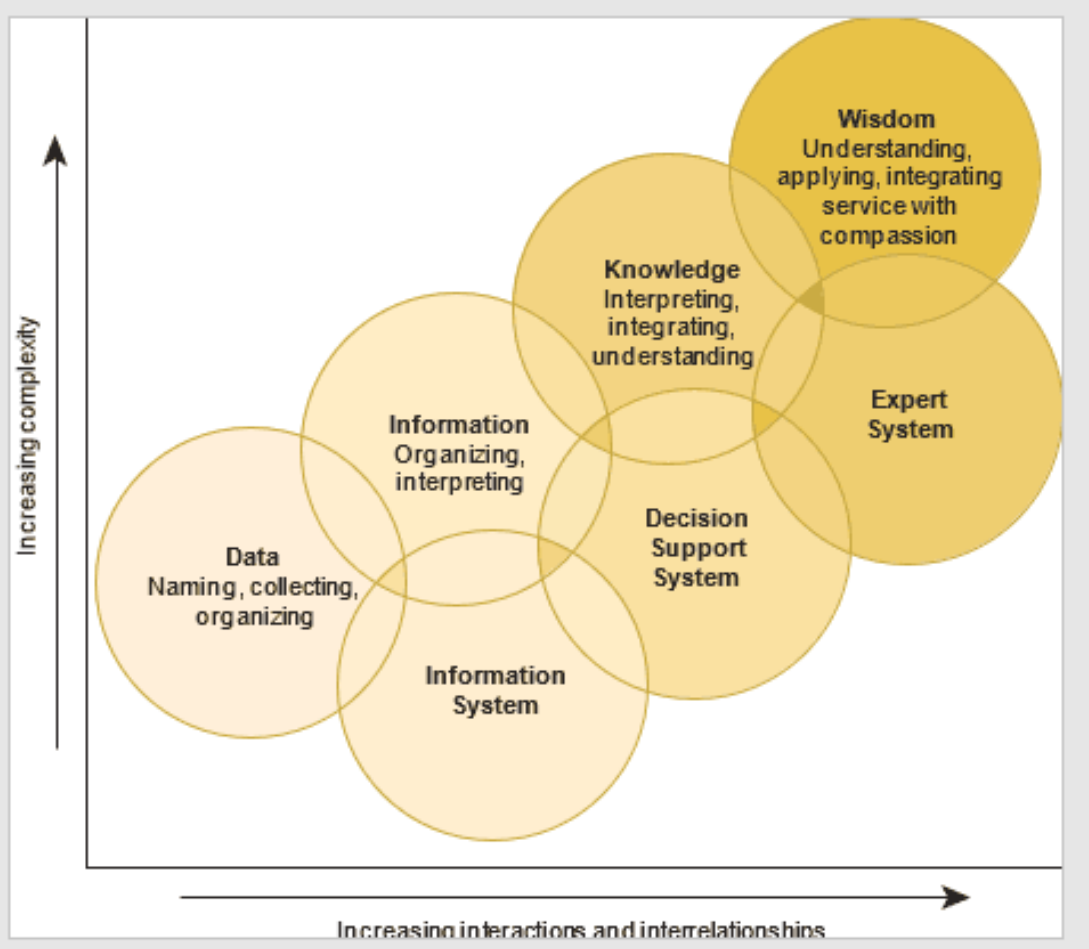
DIKW Relationships

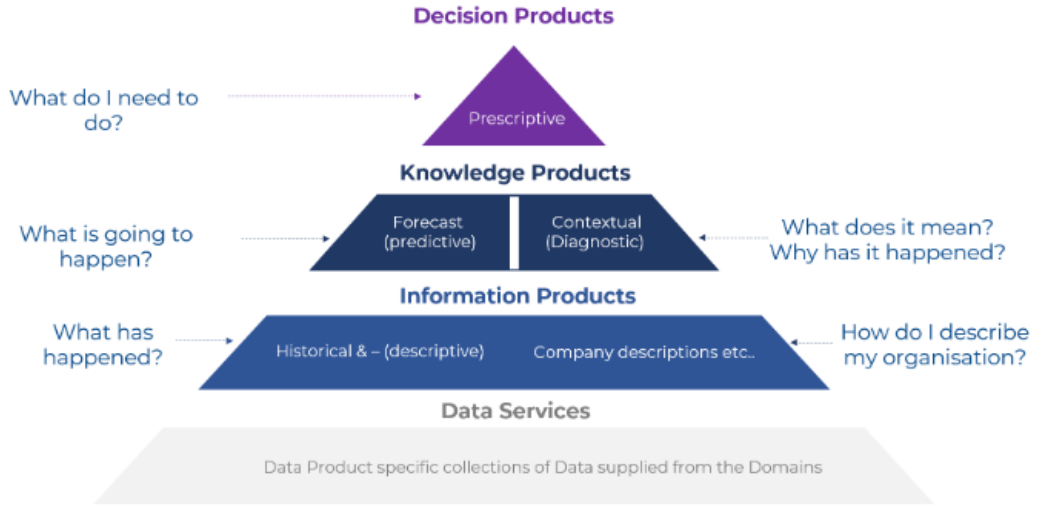




https://ojin.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol-25-2020/No3-Sept-2020/Informatics-Evolution-of-Nelson-Model-Part-2.html

Automated Systems





https://digitalfinancialreporting.blogspot.com/2024/02/a-new-business-model-is-emerging-which.html

Decision Products and Services
Insight and wisdom related to understanding what to do about what happened. What do I need to do? For example, sell your ACME company stock because based on the most current unlevered discounted cash flow model is now showing a negative value gap per share.

Knowledge Products and Services
Refined and actionable information that has been processed and organized. What is going to happen? What does it mean? Why did it happen? For example, forecasts which predict what is going to happen and why or ratio analysis that analyzes the general purpose financial reports.

Information Products and Services
Processed data provided in context in the form of information. What has happened? How do I describe my economic entity? Example, general purpose financial report that explains the financial status and financial performance of an economic entity.

Data Products and Services
Specific collection(s) of raw unprocessed data supplied from an area of knowledge. For example, financial reporting standards for US GAAP and IFRS used to create general purpose financial reports.

https://ojin.nursingworld.org/table-of-contents/volume-23-2018/number-3-september-2018/evolution-of-nelson-model-part-1/

Area of Knowledge

- An area of knowledge is a highly organized socially constructed aggregation of shared knowledge for a distinct subject matter. An area of knowledge has a specialized insider vocabulary, underlying assumptions (axioms, theorems, constraints), and persistent open questions that have not necessarily been resolved (i.e. flexibility is necessary).
- An area of knowledge can be:
  - **Kind area of knowledge**: clear rules, lots of patterns, lots of rules, repetitive patterns, and unchanging tasks.
  - **Wicked area of knowledge**: obscure data, few or no rules, constant change, and abstract ideas.
- Other terms for area of knowledge include “knowledge domain”, “universe of discourse”, “subject matter”, “domain of understanding”, or simply “domain”.

Knowledge

- Knowledge is a form of familiarity with information from some specific area (area of knowledge).
- Knowledge is often understood to be awareness of facts, having learned skills, or having gained experience using the things and the state of affairs (situations) within some area of knowledge.

Information

- Informatics is about managing information
- Information has a formal definition
- Information is something that you do not know and which you cannot derive from your existing knowledge
- Information is a “surprise”; information causes you to either change your mind and accept the information or not change your mind and reject the information
- Information is relative meaning that information has context
- Someone can already know something (knowledge) that is unknown or unheard of for others (information)
- New information can be close enough to their current knowledge to integrate; or beyond their reach so they will reject that new information as “nonsense”; this depends on what they already know and how much they are ready to change

Accumulated Knowledge

- People have accumulated knowledge over time
- Total knowledge is our civilization or an area of knowledge
- Any individual can handle only a small part of this accumulated knowledge of some full area of knowledge; tools can be used to increase the amount of information an individual can handle
- Experience and education within an area of knowledge introduces new information to that accumulated knowledge
- That new information is merged and added to accumulated knowledge of the area of knowledge

Knowledge

- Knowledge is not “bag” of random facts that an individual or area of knowledge knows about
- Knowledge is a structured, self-reflecting, and validating organic system.

Informatics

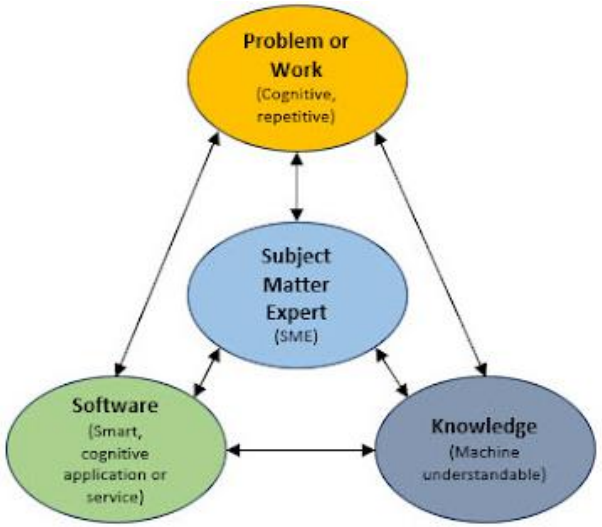
- Informatics is the conscious management of information
- Informatics spans the knowledge accumulation process of the individual member (learning)
- Informatics spans the knowledge accumulation process of an organization (institutionalized knowledge)
- Informatics spans the knowledge accumulation process or an area of knowledge (professional knowledge; subject matter)
- Informatics has theories, principles, frameworks, and strategies that can be applied to solve information management problems

Informatics

- Informatics about harnessing the power and possibility of digital technology to transform data and information into knowledge that people use every day
- Informatics is about understanding how people will “live” in the digital space with an elegance of design that makes sense to users of a particular technology
- Informatics is about delivering the best user experience possible
- Analogy to a chef: Similar to how a chef transform a recipe using kitchen equipment into an unforgettable meal; informatics transforms the use of information and knowledge into a successful experience
- Analogy to architect: Similar to an architect that transforms a building into a livable space by placing doors, windows, and utilities with functionality and ease; informatics improves “digital livability”

Symbiosis

- There is (can be) a symbiotic relationship between an accumulated body of knowledge and the individual, organization, or profession that accumulates, uses, and improves that body of accumulated knowledge
- A symbiotic relationship, symbiosis, exists between software, knowledge, and a cognitive problem/work which a subject matter expert is trying to solve/get done. It seems as though if these four things are not properly matched it is hard to see the value of the software and/or the machine understandable knowledge.



https://digitalfinancialreporting.blogspot.com/2024/03/symbiotic-relationship-between-software.html

Informatics in Physical Form

- Informatics can appear in physical form as information objects (infon)
- An information object's primary function is to generate, store, or manage information
- Information objects have one or many simple or complex states
- Information objects can be passive or active
- Information objects have patterns
- External entities with an understanding of the relevant knowledge and patterns can use or change (add, change, remove, use; CRUD)
- Physical objects are used for their "beyond-human" reliability and speed (like an electronic calculator or computer)

Information Stores

- Information stores can be static (like a book) or dynamic (like an abacus or calculator register)
- Passive information objects can provide information (sign, sundial, lighthouse, sensor reading)
- Active information objects can change their state by executing algorithms

Algorithms

- Algorithms can be
  - static (physically fixed like clock or circuit board, hardware),
  - semi-static (use changeable external configurations to describe behavior, such as a switch, rules), or
  - fully dynamic (algorithm is part of the system state, program)

Implementation

- Implementation creates the “beyond-human reliability and speed”
- Implementation is a “fight” against physical limitations
  - Noise (i.e. not signal)
  - Unclear states
- An implementation cannot randomly change, change must be reliably controlled
- Machine-like (repeatable, predictable) operation is required from the information processing machine implementation layer
- There tends to be three primary categories of implementation:
  - Semantic web stack
  - Graph database
  - Logic programming

https://digitalfinancialreporting.blogspot.com/2024/03/problem-solving-systems.html

Implementation

- ***Law of Conservation of Complexity***: Every software application has an inherent amount of irreducible or essential complexity. The question is who will have to deal with that complexity: the application developer, the platform developer that the software runs on, or the software user.
- ***Irreducible Complexity***: the complexity of the design requires that it can't be reduced any farther without losing required functionality.
- ***Accidental Complexity***: Accidental complexity refers to challenges someone unintentionally make for themselves as a result of trying to solve a problem.
- ***Kludge***: A kludge is an engineering/computer science term that defines what is best described as a workaround or quick-and-dirty solution that is typically clumsy, inelegant, inefficient, difficult to extend and hard to maintain; but it gets the job done.
- ***Elegant Simplicity***: Elegance is grace and beauty that shows unusual effectiveness and simplicity.
- ***Simplistic***: Dumbing down a problem to make solving the problem easier to implement; i.e. removing required capabilities.

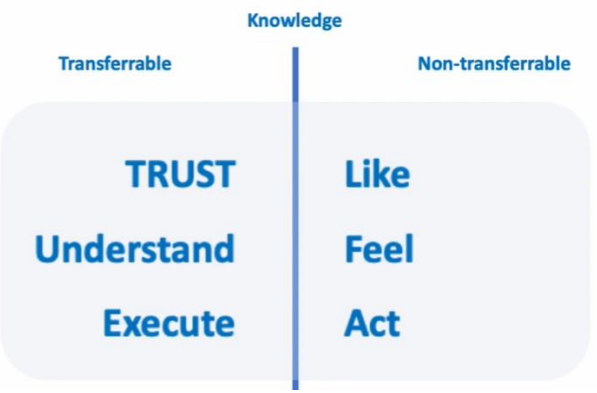
Complexity

- **Best practices**: things that tend to be obvious even to people outside an area of knowledge. There tends to be only one way to do something which makes sense.
- **Good practices**: things that are a bit more complicated but the subject matter experts within an area of knowledge that have skills and experience tend to agree on these practices. Different groups can use different preferred good practice approaches as a matter of policies.
- **Emergent practices**: things that are even more complex and subject matter experts within an area of knowledge tend to disagree with one another as to what the good practices are which leads to multiple different views, each which is reasonable based on the principles of an area of knowledge and the logical patterns of the situation
- **Novel practice**: this is similar to emergent practices except that there are no identifiable logical patterns of the situation and no identifiable principles that can be applied; but logical answers can be figured out but the clustering of answers is more spread out, not as tight.

Global Infrastructure

- Combining the theoretical and physical aspects of informatics allows for the creation of a global infrastructure for managing information and knowledge
- Must support evolving global operations needs
- Must provide reliable information and predictions
- Having one single “master” location for all information and accumulated knowledge avoids ambiguity
- Single source of master can be replicated (faster access)
- Versioning control system allows controlled parallel experimentation, transparency into change history, access control, dependency management
- Not having one single “master” source involves more work (i.e. determining which of multiple sources is the right source)

Knowledge

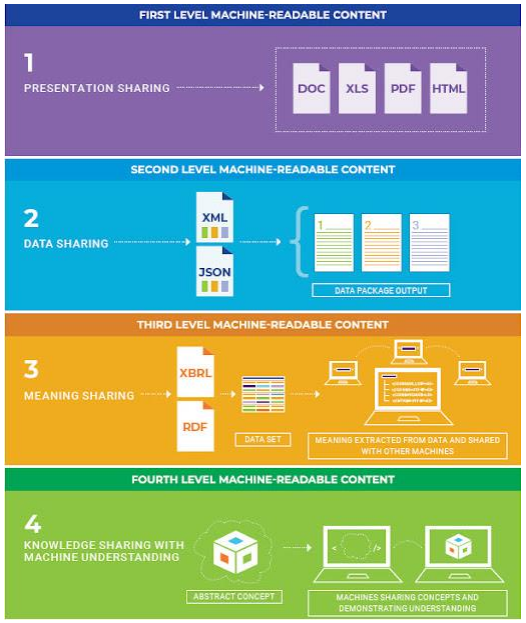


- Knowledge can be grouped into two categories:
  - Transferable knowledge – objective; independent from human interpretation and emotions; goal is to make human minds uniform, reliable, replaceable; playing a role as perfectly as possible rather than “showing off with risky tricks”
  - Non-transferable knowledge – subjective; involves emotions and personal preference; affects every individual differently therefore changes how knowledge is processed
- Information systems only work with transferable knowledge
- Imagine all transferable knowledge of the area of knowledge of accounting and reporting using US GAAP as one huge library

Today: IT works against its goal; the proper management of information

- Current approach supports content creation by anyone
- Sheer amount makes human processing or quality control impossible or extremely time consuming and expensive
- The “standard” is a mediocre average
- Repetition is not quality
- Cautious authoring of each and every fragment
- Cut redundancy and ambiguity

Information Understandability



- **Presentation level sharing**: Understandable by humans, not understandable by machines, no low-level model, no high-level model.
- **Data level sharing**: Not understandable by humans, understandable by machines, local or no low-level model, no high-level model.
- **Meaning level sharing**: Not understandable by humans, understandable by machines, global oriented low-level model, no high-level model. (Can be understandable to motivated, technical oriented humans).
- **Knowledge level sharing with machine understandability**: Understandable by humans, understandable by machines, global oriented low-level model, global oriented high-level model. (Can be understandable to business oriented humans).

https://digitalfinancialreporting.blogspot.com/2024/04/understandability.html

Accounting, Reporting, Auditing, Analysis

- Accounting and auditing informatics is the accounting/auditing specialty that focuses on using the tools and processes inherent in automation to achieve the goals of financial accounting, reporting, auditing, and analysis.
- Computers are excellent devices for managing the smallest of details, thereby supporting a safer, more efficient, and more effective quality accounting information system. At the same time, computers are able to manage enormous databases of information and knowledge. But in the end – at the point of outcome – what is important is the ability to apply these tools in helping clients creating financial reports, consumers of those financial reports, financial markets that make decisions based on reported financial information.
- One must always remember that the evolving capabilities of computers do not define the scope of practice for accounting/auditing informatics; rather, it is how accountants, auditors, and analysts use these tools that define their profession.
- In turn, if we do not understand how financial accountants, auditors, and analysts at all levels of knowledge and experience use computers to support their profession, we cannot design automated systems that truly support the goals of the institution of accountancy.

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