1. Informatics

There is no one formal definition of informatics as far as I can tell. This is one definition that I synthesized from other definitions that I like:

Informatics[1] relates to the intersection of information, people, and technology and the practical application of computational systems; understanding how people will "live" in the digital realm within some specific area of knowledge that makes sense to users of that technology.

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

Key terms related to informatics include:

- DIKW Model
- Information
- Knowledge
- Common knowledge
- Accumulated knowledge
- Area of Knowledge
- Understandability
- Information Exchange Standards

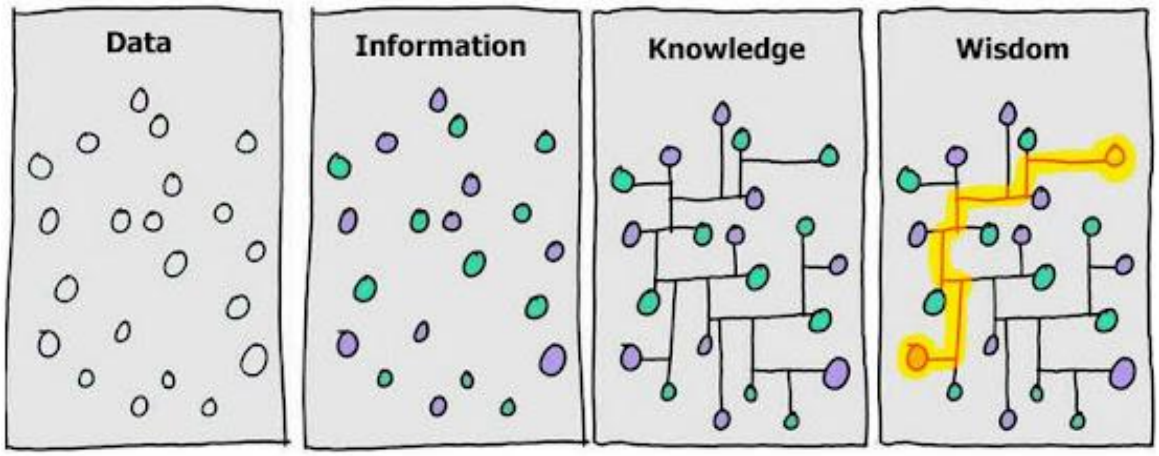
[1] Wikipedia, Informatics, https://en.wikipedia.org/wiki/Informatics

- Knowledge Representation and Reasoning
- Knowledge Commitment

We are in the information age[2]. Some call this the third industrial revolution, others say it is the fourth industrial revolution. Ditch the "data" perspective!

1.1. DIKW Model

The DIKW Model explains the important difference between data, information, knowledge, and 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
- ***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.

Insight is the process of turning knowledge into wisdom.

1.2. Information

Information has a formal definition. *Information* is something that you do not know and which you cannot derive from your existing accumulated knowledge. Information relates to facts about a subject matter in a context. 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 of for others (information).

- Facts carry information.
- Information content of a fact is a true proposition.

[2] Wikipedia, *Information Age*, https://en.wikipedia.org/wiki/Information_Age

- Information a fact carries is relative to a context.
- Information can be stored and transmitted in a variety of physical, technical forms.

1.3. Knowledge

Knowledge is a form of familiarity with information from some specific field or 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, changes in a state of affairs) within some area of knowledge.

Knowledge is not "bag" of random facts that an individual, institution, or area of knowledge knows about. Knowledge is a structured, self-reflecting, verifiable, provable system.

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.

1.4. Common Knowledge

Common knowledge is a type or category of knowledge and refers to information that the typical person with skill and experience within a specific area of knowledge would accept as correct.

What may be common knowledge of an area of knowledge in one local might be different that the common knowledge in some different local.

1.5. Accumulated Knowledge

Accumulated knowledge is information collected over time. Accumulated knowledge is total knowledge collected by an individual, an institution, an area of knowledge, or a society.

An individual can handle only a relatively small portion/part of this total accumulated knowledge of some full area of knowledge. However, 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 total accumulated knowledge. That new information is merged and added to accumulated knowledge of the specific area of knowledge.

1.6. 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".

The complexity patterns of an area of knowledge can be explained by the Cynefin Framework[3]. The transferable knowledge of an area of knowledge can be categorized into the following groups:

- ***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.

Disorder is not transferable knowledge. Norms of an area of knowledge, in the form of best, good, emergent, and novel practices is transferable knowledge; but they each works a little differently.

1.7. Understandability

Understandability is the ability to make use of information and knowledge. There are levels of information/knowledge understandability[4]. The following is a summary of those levels:

- ***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.

[3] YouTube.com, *Complexity, Cynefin, and Agile*, https://www.youtube.com/watch?v=-F4enP8oBFM

[4] Understandability, https://digitalfinancialreporting.blogspot.com/2024/04/understandability.html

- ***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).

When a human or a machine understands information and knowledge then that information or knowledge can be used by a process or system.

1.8. Information Exchange Standards

Standards can be created to minimize the idiosyncrasies of *syntax* (e.g. differences in physical technical format preferred by different information technology professionals) and semantics (e.g. differences in conveying meaning by business professionals). Use of standard information exchange medias makes things easier. In order to make use of a knowledge media effectively, the following three conditions must be satisfied:

1. ***Easy for knowledge bearer to represent information***: The effort and difficulty required for the knowledge bearer to successfully formulate the knowledge in the medium must be as low as possible.
2. ***Clear, consistent meaning***: The meaning conveyed by the knowledge bearer to the knowledge receiver must be clear and easily followed by human beings and be consistent between different software applications.
3. ***High-quality information representation***: The form in which the knowledge is represented to the receiver must be as good as possible. The quality must be high whether the knowledge receiver is a human-being or an automated machine-based process.

1.9. Knowledge Acquisition

There are no short cuts. No one really disputes the need for models and a "thick layer of metadata" to get a computer to perform work. What is disputed is the best way to get that thick layer of metadata and those models. Machine learning works best if you already have a thick layer of metadata, that is the training data that machine learning needs to work.

There tends to be three approaches to acquiring knowledge:

- ***Handcrafted knowledge***: Skilled and experienced subject matter experts for some area of knowledge create/construct the knowledge representation. This approach can be costly and take time, but it also yields the highest result if done correctly.
- ***Statistical learning***: Also referred to as machine learning, of which there are various forms, but all approaches are based on probability and statistics. While this approach can cost less, the quality can be significantly lower. This tends to be referred to as unsupervised learning.
- ***Combining handcrafted knowledge approach and statistical learning approach***: Combining both approaches, called supervised statistical learning,

is where humans and machines work together to achieve the highest quality result with the least expense and time being involved.

1.10. Knowledge Representation and Reasoning

Knowledge representation and reasoning (KRR)[5] is about converting information from an area of knowledge into machine understandable form and then enabling a machine such as a computer using software to process that information in a manner that is as good as a human could have performed that task/process or even better than a human could have performed that task/process (e.g. beyond-human capabilities). Knowledge must be acquired, represented, and then some reasoning process performed.

The following approaches can be use to represent knowledge beginning with the least expressive approach and ending with the most expressive approach:

- Name authority (dictionary)
- Thesaurus
- Taxonomy
- Ontology
- Theory

The following are the reasoning approaches that can be used to reason against some set of knowledge:

- Deductive reasoning
- Inductive reasoning
- Abductive reasoning

1.11. Knowledge Commitment

The notion of knowledge commitment[6] is similar to the notion of ontological commitment. In simple terms, when you make an ontological commitment, you're essentially saying "I agree that these things exist in the way we have defined them in our shared understanding and I will use these definitions, associations and rules consistently when we talk about those things." This shared understanding enables all sorts of possibilities. When the stakeholders of a system agree, make a knowledge commitment, achieving goals and objectives using automated information systems becomes possible.

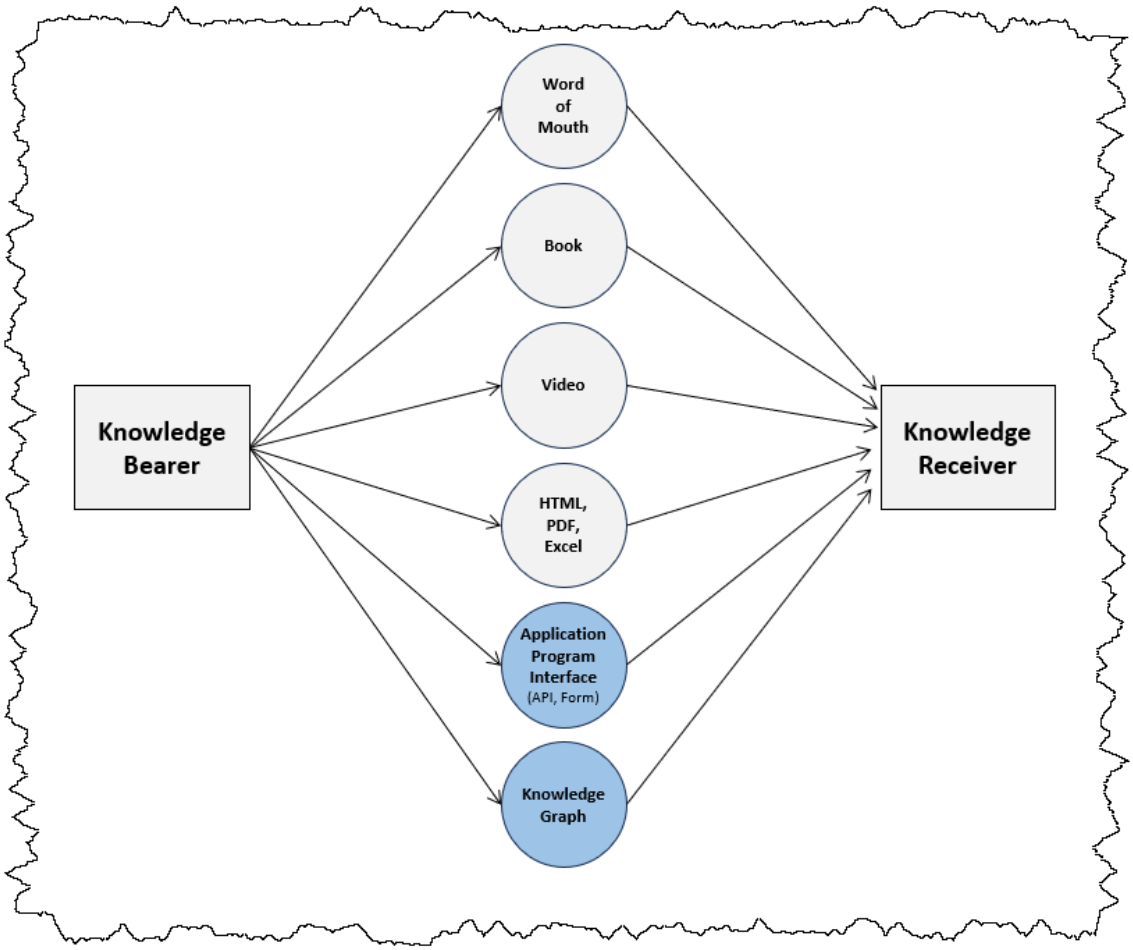
1.12. Mediums of Exchange

New mediums of exchange are available. A logical digital twin of a financial report is a knowledge graph that can be used to exchange information reliably and therefore effectively:

---

[5] Knowledge Representation and Reasoning (KRR), https://digitalfinancialreporting.blogspot.com/2024/04/knowledge-representation-and-reasoning.html

[6] Knowledge Commitment, https://digitalfinancialreporting.blogspot.com/2023/12/knowledge-graph-commitment.html



1.13. Digital Proficiency

A paradigm shift is occurring. This shift is caused by the difference between how "realspace" (the real world, analog) and "cyberspace" (cyberspace, the internet, digital) operate.

Lawrence Lessig explains this difference in his book, *Code and Other Laws of Cyberspace*[7]. The book outlines what is called the *Theory of Regulation* or the *Pathetic Dot Theory*[8]; the four forces that constrain our actions:

- **Laws and regulations**: The law threatens sanction if rules are not obeyed.
- **Norms**: Social norms are enforced by the community.
- **Markets**: Supply and demand (e.g. better, faster, cheaper) set a price on various items or behaviors.
- **Architecture**: The "social architecture" whether natural (made by nature) or designed (manmade) constrain our actions.

[7] Wikipedia, *Code and Other Laws of Cyberspace*, https://en.wikipedia.org/wiki/Code_and_Other_Laws_of_Cyberspace
[8] Wikipedia, *Pathetic dot Theory*, https://en.wikipedia.org/wiki/Pathetic_dot_theory

"Digital" is a thing, it is causing many changes, and not understanding what will change, why, and how is becoming increasingly risky. Accountants must choose what type of "cyberspace" they want. The great transmutation to digital[9], things like algorithmic regulation, will cause the world to work in different ways than it has worked in the past. To achieve this, you need to understand not just your area of knowledge; but also, technology as it might be applied to your area of knowledge. But also, efficiency without quality is useless.

To choose, accountants need to have digital proficiency.

This document provides a bit of theory for grounding; but focuses on practical application.

Proficiency is the capability, skill, and knowledge that you might have for doing something. Proficiency is a progression. There are general levels of proficiency: literacy, fluency, mastery.

One key benefit of digital proficiency is that it helps you understand the true limitations of technology.

[9] Charles Hoffman, CPA, *The Great Transmutation*, https://xbrlsite.azurewebsites.net/2022/Library/TheGreatTransmutation.pdf