Model-driven Information Exchange (Reporting) Overview

Charles Hoffman, CPA

https://seattlemethod.blogspot.com/2025/01/overview.html

Model-driven, semantic-oriented, standards-based, artificial intelligence powered

Domain agnostic fault intolerant global standards based multidimensional fact model grounded in domain logic

Framework for “dissecting” a domain of understanding to digitize it

- A **community of stakeholders** trying to achieve a specific goal or objective or a range of goals/objectives must agree.
- A **system** is a specification specific behavior.
- **Principles** help you think about something thoroughly and consistently. Overcoming disagreements between stakeholders and even within groups of stakeholders is important and principles can help in that communications process.
- **Logic** is a communications tool. Computers understand logic and humans have an innate understanding of logic.

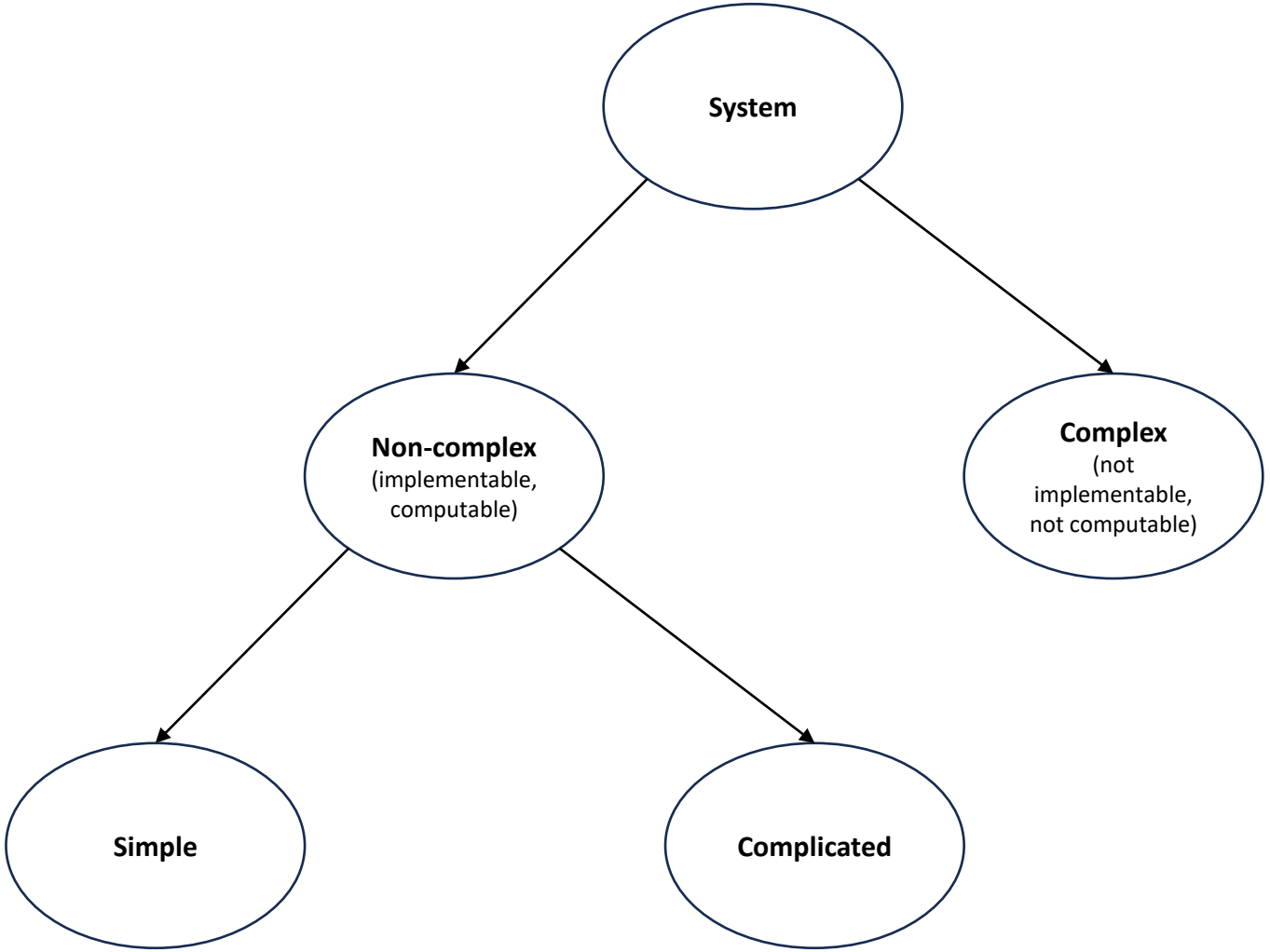
Framework

- A ***hypothesis*** is a testable explanation or guess about why something happens. A hypothesis helps to think about and test an idea. A ***theory*** is a well supported explanation of why something happens. A theory is used to explain an idea or ideas. A ***law*** describes (makes a statement about) a universal principle or phenomenon that consistently predicts what will happen under specific conditions and is based on empirical evidence from observations. Laws describe what happens. **Another term for law is principle**.
- A ***framework*** is an essential supporting structure on top of which other things are built to solving a problem. A framework is an abstraction that makes solving a problem easier. A framework is a system.
- ***Atomic Design Methodology*** is a mental model for designing systems.
- ***Lean Six Sigma*** is a set of principles, philosophies, and techniques (control techniques) to achieve high quality. As an example, quality can improve from sigma level 3 with defects per million opportunities of 66,807 and quality at about 93% to sigma level 6 with a defect rate per million opportunities of 4 and quality at about 99.666%.

Important Definitions

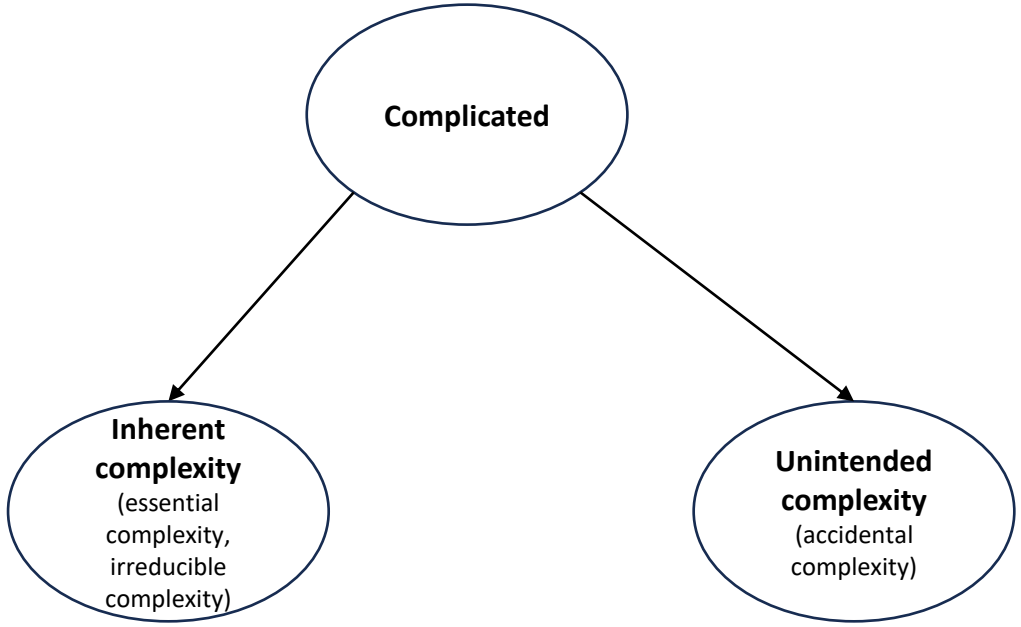
- **System**: A system is a set of elements, categories or sets into which the elements fall, and interaction patterns that describe the interactions between the different types of elements within a system. A system is a specification for behavior. A system is adequate if the system meets the aim of the stakeholders of the system.
- **Complexity**: A system can be simple, complicated, or complex.
  - **Non-complex** (implementable, computable)
    - **Simple system**: The system is "non-complex" and therefore computable; clear and obvious for a non-subject matter expert to understand, and the set of elements, categories, and interaction patterns are fully understood. *Control techniques can be used to eliminate all risk from the system.*
    - **Complicated system**: The system is "non-complex" and therefore computable; clear and obvious for a subject matter expert in the area of knowledge to which the system relates to understand, and the set of elements, categories, and interaction patterns are fully understood. *Control techniques can be used to eliminate all risk from the system.*
  - **Complex** (not implementable or partially implementable, not computable)
    - **Complex system**: The system is "complex" and therefore NOT computable; tend to lack clear boundaries, tend to be constantly changing and evolving, there tend to be large numbers of elements, categories, and interaction patterns which are not completely understood, the system seems to contradict itself on occasion, and the number of forces impacting the system tends to be large and the dynamics are not well understood. Control techniques cannot be used to fully eliminate all risk from the system.
      - Complex systems with non-complex subsystems: A complex system with some simple or complicated subsystems which can be separated and some aspects made computable.
      - Complex systems which can be simplified to simulate non-complex systems: A complex system which can be "dumbed down" to a degree to enable the system to be computable but also adequately meet the goals and objectives of system stakeholders.

System



https://seattlemethod.blogspot.com/2025/01/system.html

Complicated

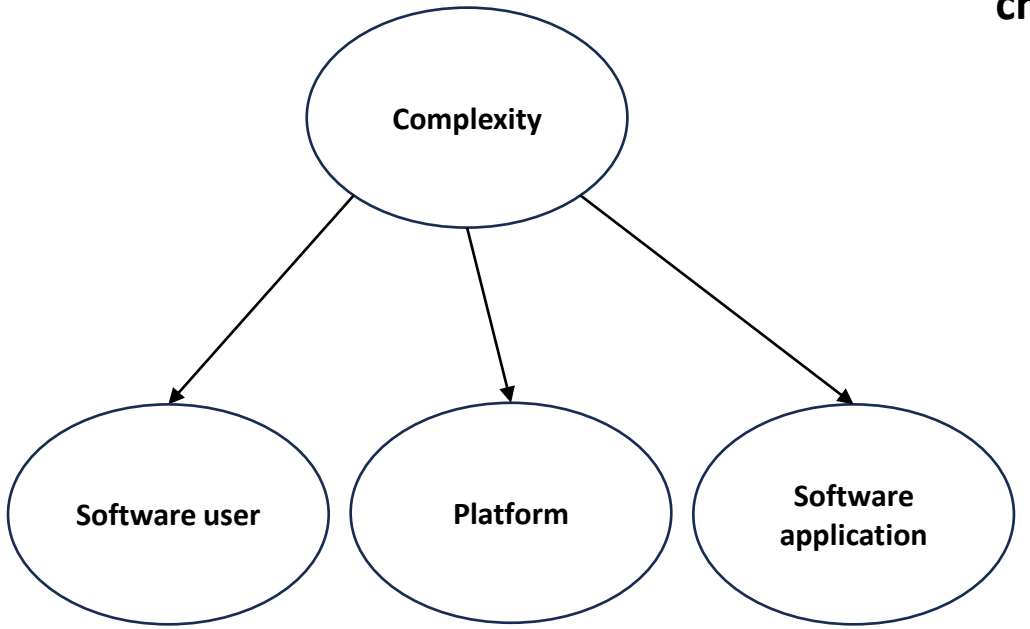


Occam's Razor, when faced with multiple explanations for a phenomenon, the simplest one is usually the most accurate.

https://seattlemethod.blogspot.com/2025/01/complexity.html

Law of Irreducible Complexity

Moral implications of choice



Law of Irreducible Complexity, cannot remove or eliminate complexity from a system…but you can move the complexity.

Framework of Complexity; Patterns of Complexity

https://seattlemethod.blogspot.com/2025/01/area-of-knowledge.html

Multidimensional Fact Model

Many domains or areas of knowledge are inherently dimensional.

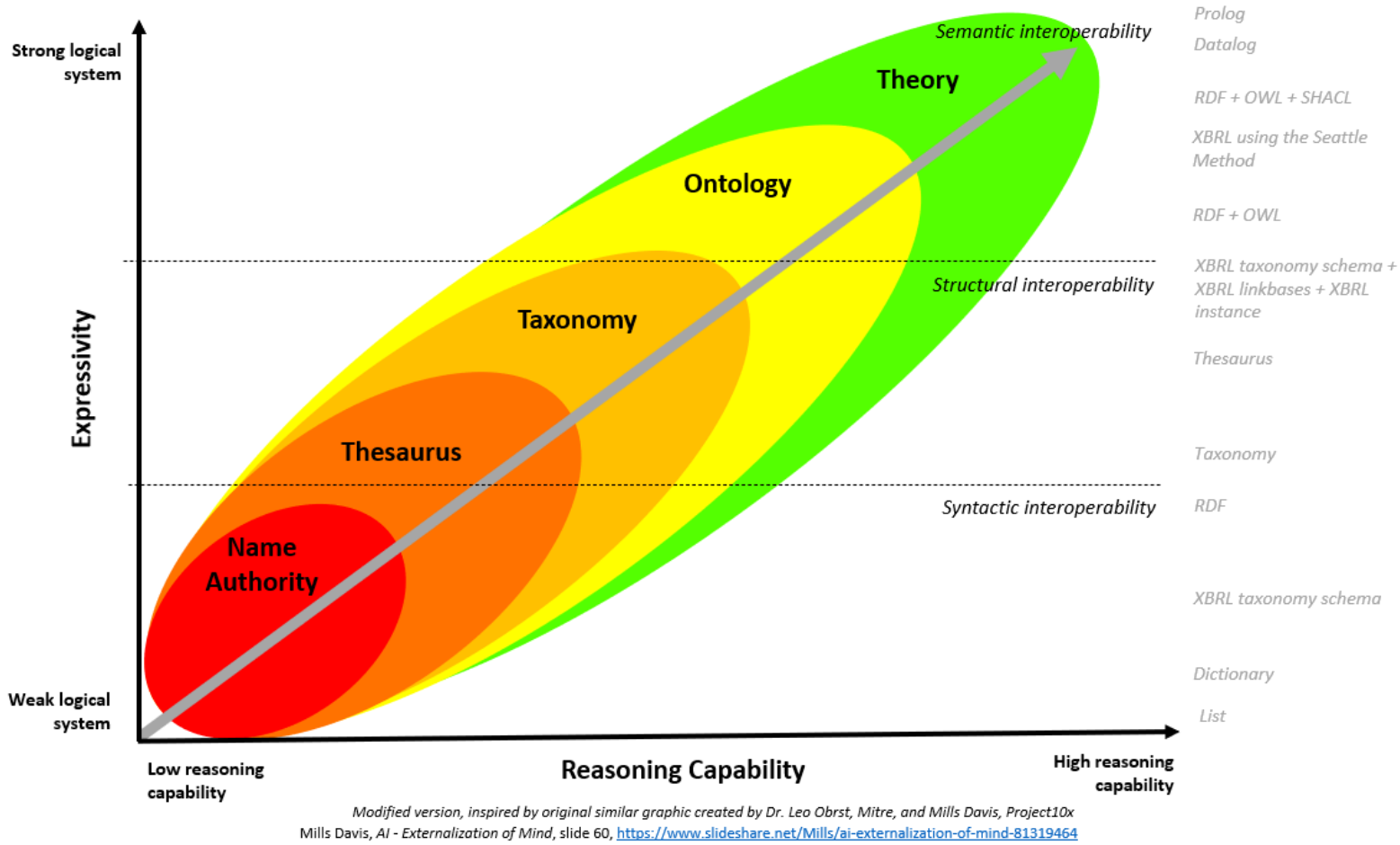
Why should every domain or area of knowledge create their own multidimensional model?

RDF does not provide a multidimensional model. You can create a multidimensional fact model using RDF.

https://specifications.xbrl.org/work-product-index-group-dimensions-dimensions.html

Ontology (OWL) + Rules (SHACL) = Knowledge

Theories can contain ontologies; but not all ontologies are theories.



Modified version, inspired by original similar graphic created by Dr. Leo Obrst, Mitre, and Mills Davis, Project10x
Mills Davis, *AI - Externalization of Mind*, slide 60, https://www.slideshare.net/Mills/ai-externalization-of-mind-81319464

https://digitalfinancialreporting.blogspot.com/2024/02/logic-programming-and-theories.html

DATALOG is Safe from Catastrophic Failures

Logical paradoxes, infinite loops are examples of catastrophic failures.

PROLOG = DATALOG + Functions; Prolog is NOT SAFE because of the functions. Horn logic is safe.

https://digitalfinancialreporting.blogspot.com/2023/05/modern-prolog.html

RULE BASED vs PROBABILITY BASED

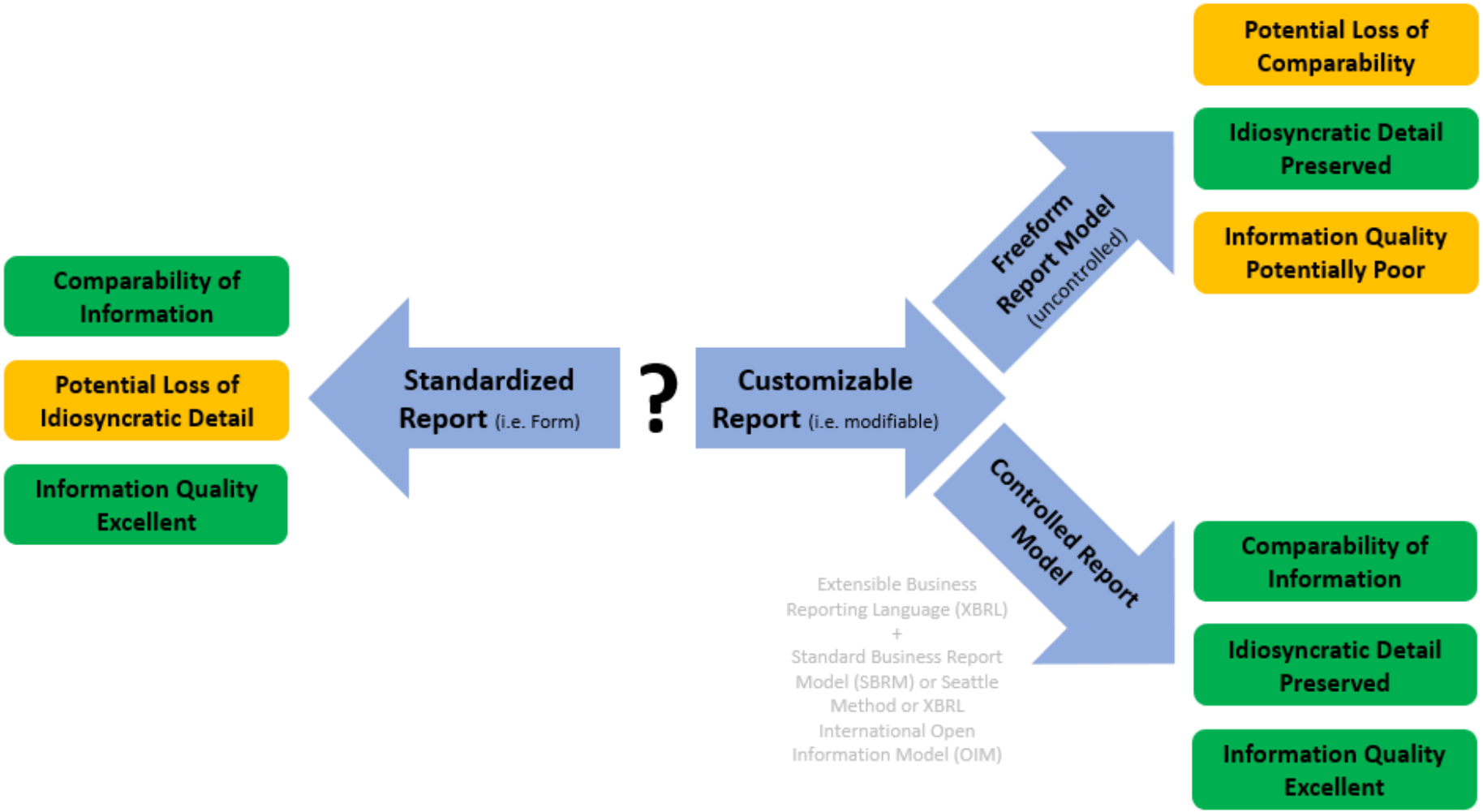
Rule based systems (deduction) = Guaranteed result every time.

Probability based systems + Humans = Very good results, but not guaranteed.

Probability based systems (i.e. with no humans) = Can be right many times, but can also be wrong. Cannot be guaranteed. Not dependable.

The right tool must be used for the task.

Controlled Flexibility

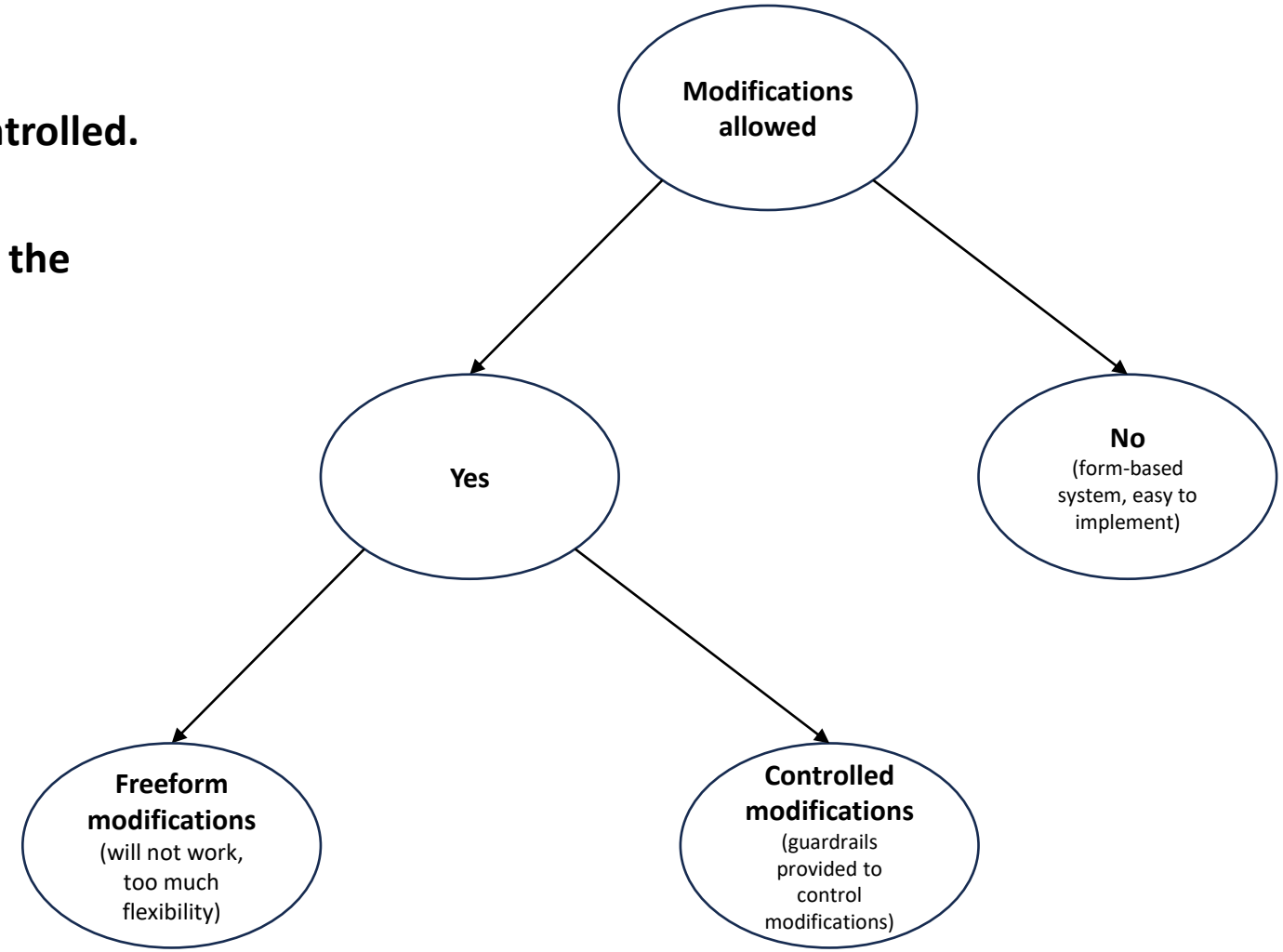


https://digitalfinancialreporting.blogspot.com/2022/12/the-seattle-method.html

Fault Intolerant Systems (systems must work correctly or very bad things happen)

Modifications must be controlled.

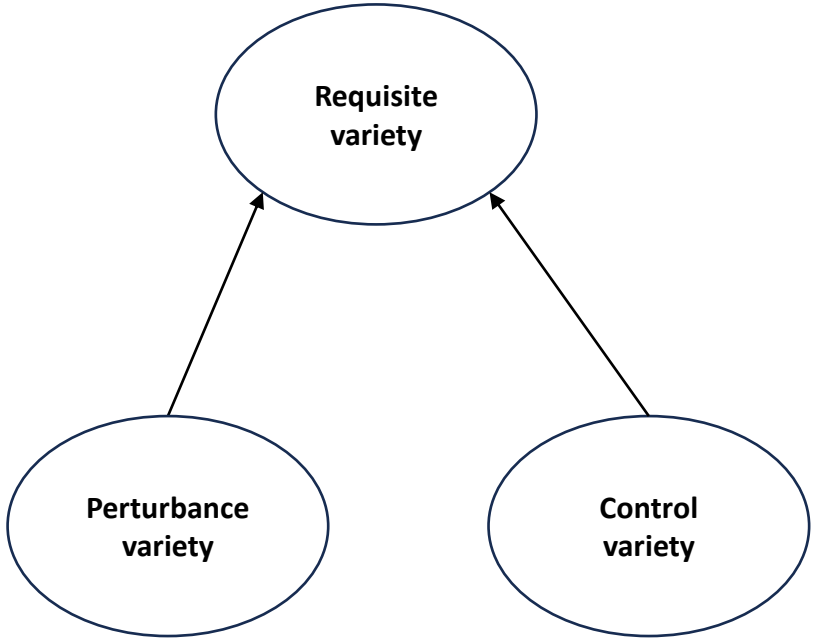
Maximal fault reduction is the goal.



Law of Requisite Variety

Requisite variety refers to the principle that in order to effectively regulate a system, the regulator of that system must possess a sufficient range of actions to counter act the variety of important potential disturbances that system might encounter. The principle of requisite variety ensures that the system's internal state remains as close as possible to the desired goal state of the system.

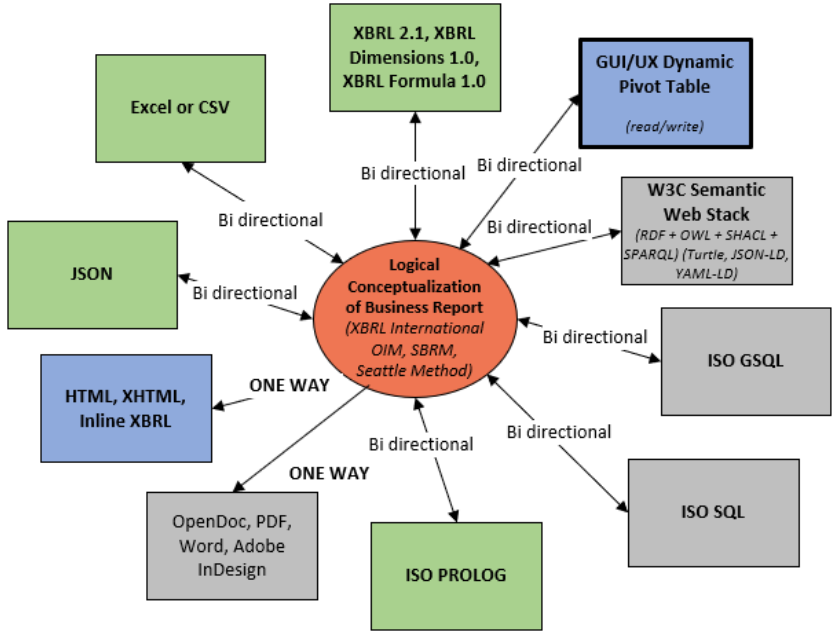
Requisite variety requires that there be a balance or "matching" between the potential possible disturbances which may occur within a system or "perturbance variety" and the rules available to the system to counter act those possible disturbances or "control variety" to make sure the important potential system faults or "residual variety" is as close to 0 as possible, preferably equal to zero.



https://digitalfinancialreporting.blogspot.com/2024/07/the-law-of-requisite-variety.html

Standards-based Approaches

- Seattle Method
- XBRL International's Open Information Model (OIM)
- Object Management Group's Standard Business Report Model (SBRM)

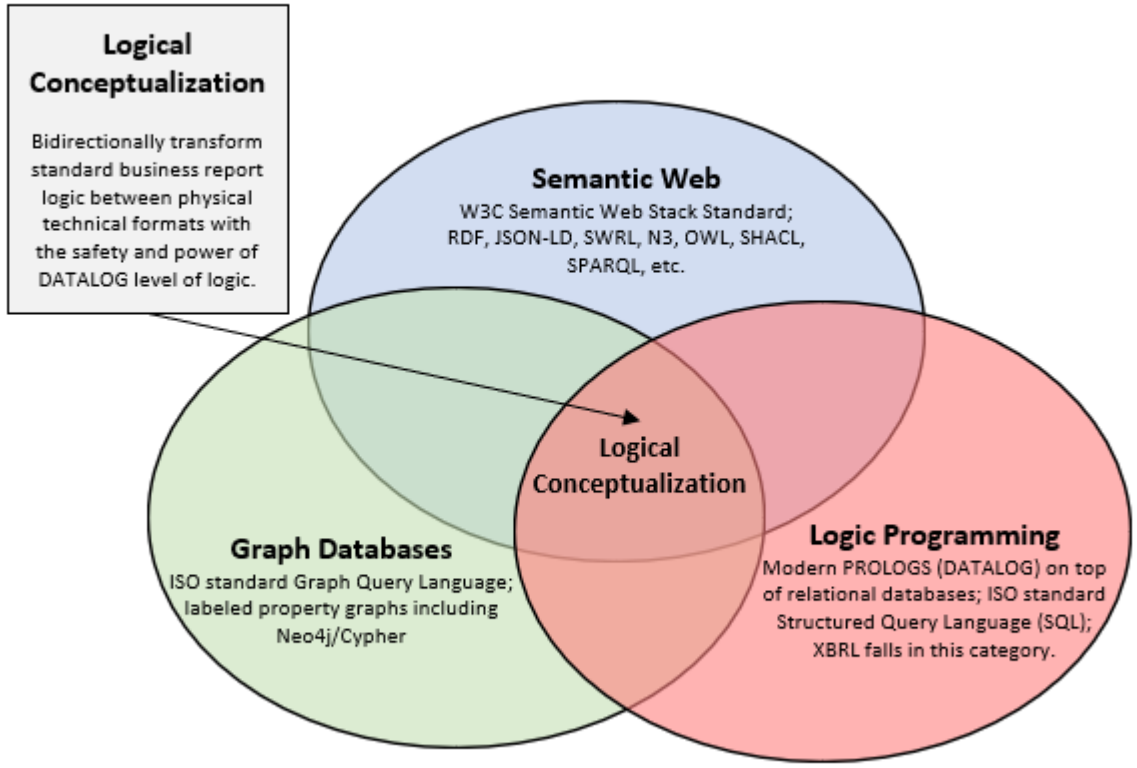


https://digitalfinancialreporting.blogspot.com/2022/12/the-seattle-method.html

Alignment

There are Multiple Technology Stacks which Enterprises may choose to implement software applications.

Alignment of Label Property Graphs, Semantic Web, and Logic Programming



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

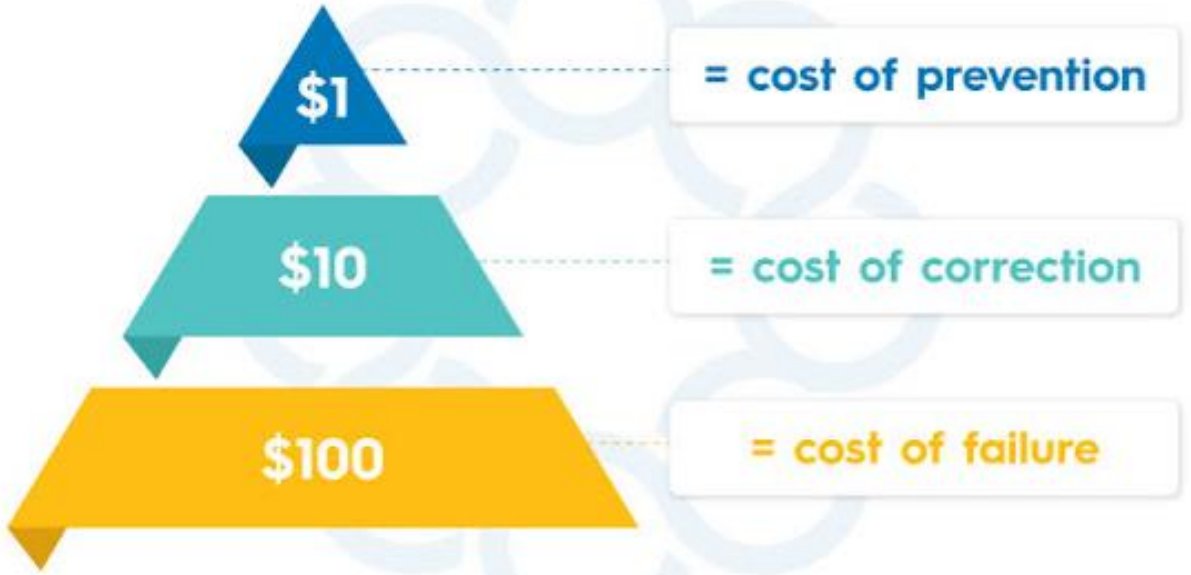
Understanding True Cost of System Inaccuracy

Comparing relative cost of preventing, correcting, and cost of errors, consider this. In relative terms, fixing a system to prevent a problem costs say $1 whereas having to correct a problem after it has occurred costs $10 as contrast to having to deal with the cost of the failure related to not detecting the problem is about $100.

Data janitors?

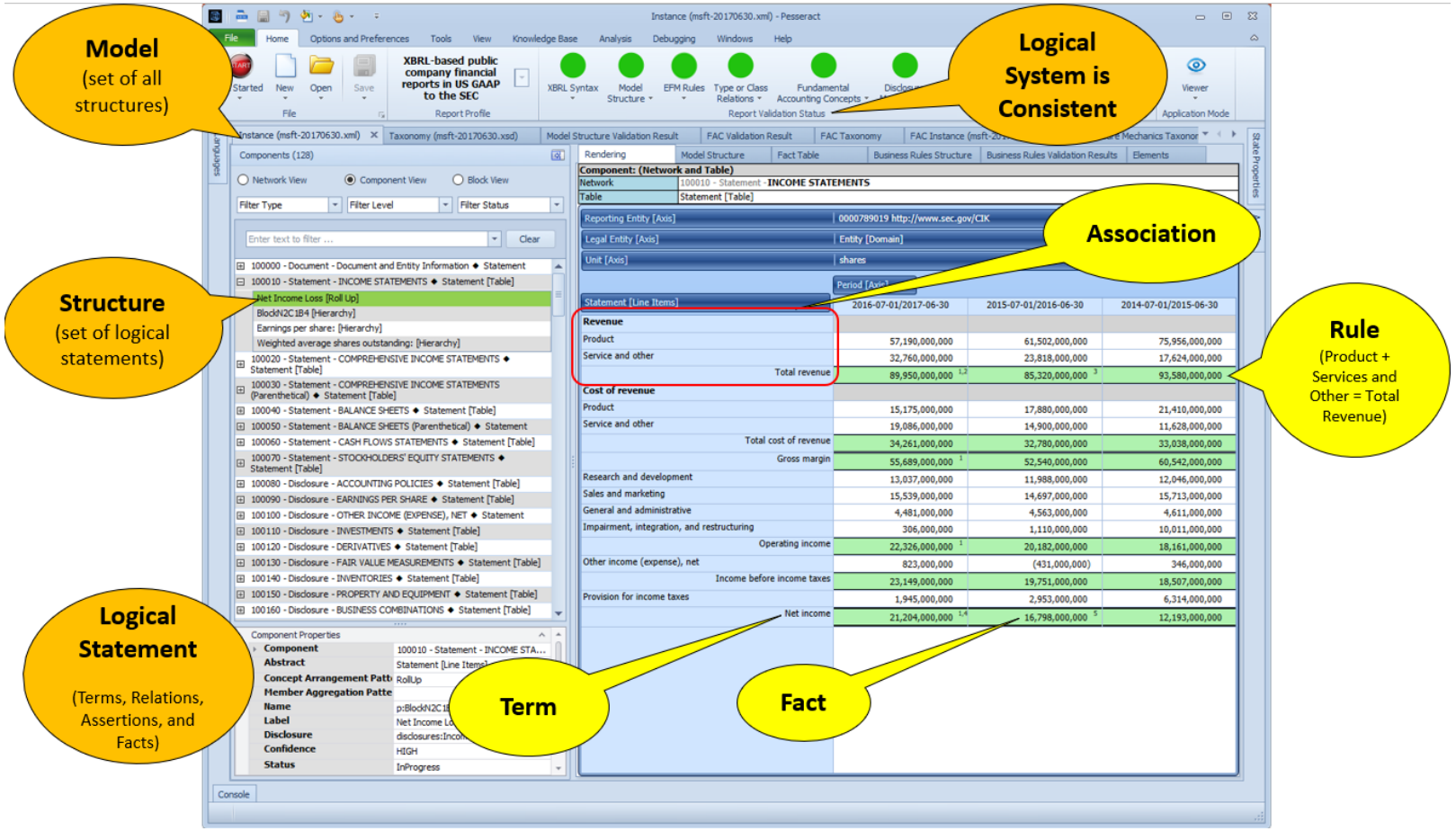
Most systems are held together with what amounts to duct tape. Or bailing wire and band aids.

We need better duct tape; right?



https://digitalfinancialreporting.blogspot.com/2024/01/solving-problems-of-accidental.html

Domain agnostic fault intolerant global standards based multidimensional fact model grounded in domain logic, not abstruse technical gookgobbledygook



https://digitalfinancialreporting.blogspot.com/2024/12/financial-statement-mechanics-and.html

Summary

- This approach advocates for a versatile information model, applicable to various domains, designed to overcome the threat of inaccuracies, based on global standards, supercharged by artificial intelligence, and structured to enable efficient and effective analytical processing, while also adhering to the specific business rules of the relevant domain. The approach has a global perspective as contrast to a local only perspective.
- This approach is modeled after an approach created for financial reporting which has very low tolerance for error.

http://xbrlsite.com/2025/Library/ShowcaseOfXBRLBasedDigitalReports.pdf