



NASA Knowledge 2020 4.0 Conference

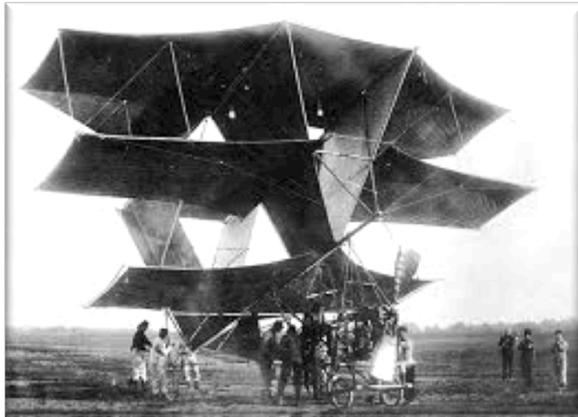
New Research in Knowledge at MSFC

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Epistemological Roots of Justification

What are you proposing?



Is it going to work?

How do you *know*?

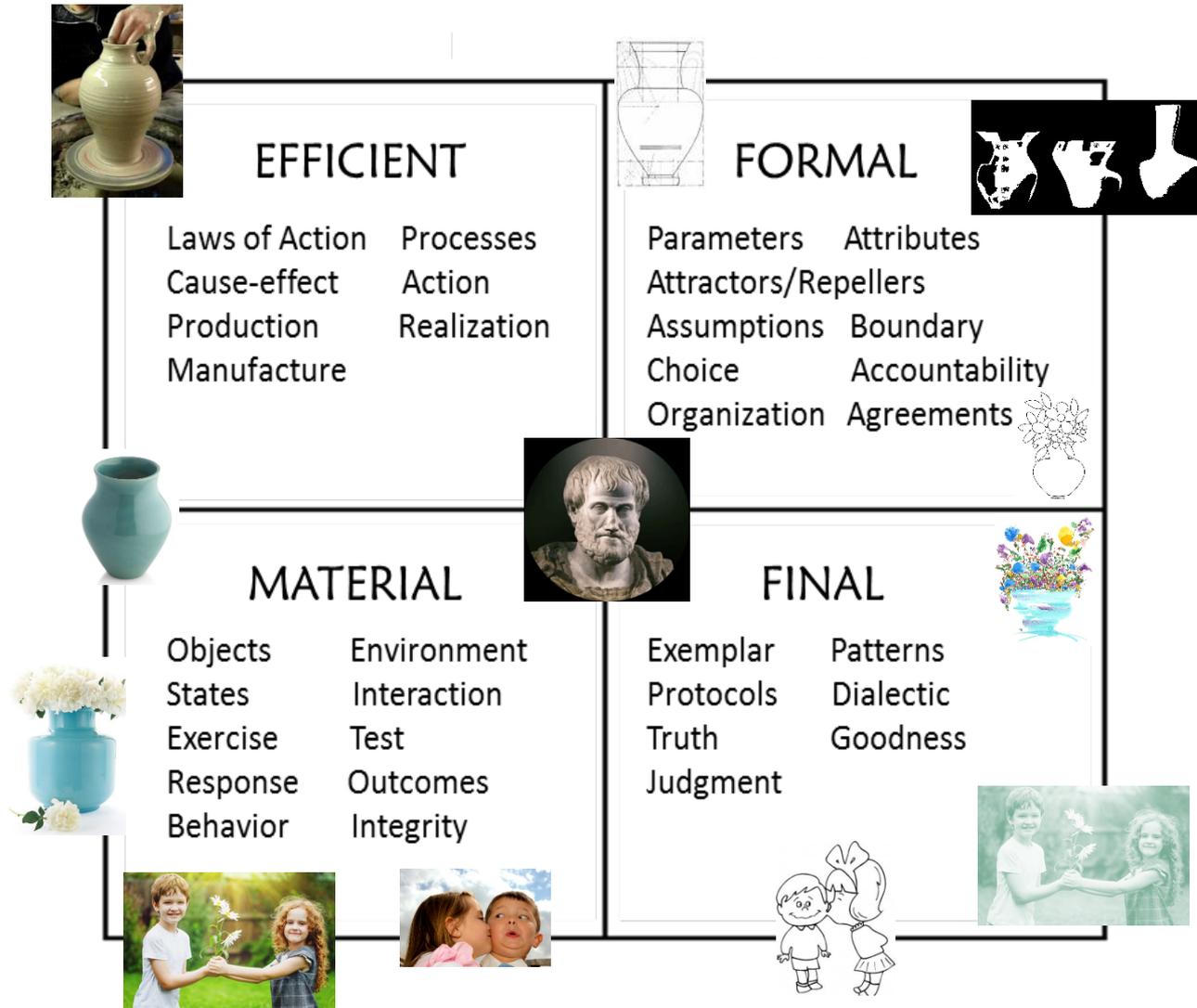


How do you know?

- Epistemology
 - The philosophy of knowing
- Ontology
 - The philosophy of meaning
- Explanations of “Why <thing>?”
 - Aristotle’s “Causes”
 - “Why breakfast” (Kineman, 2003) *
 - Material cause – Ingredients, shape (things), the thing first made (phenomenal element), the environment
 - Efficient cause – cooking (process), the chef
 - Formal – recipe (design), the breakfast logistics planner
 - Final cause – one’s hunger and desire to eat (purpose), the desirer



Aristotle "Causes" = Explanations

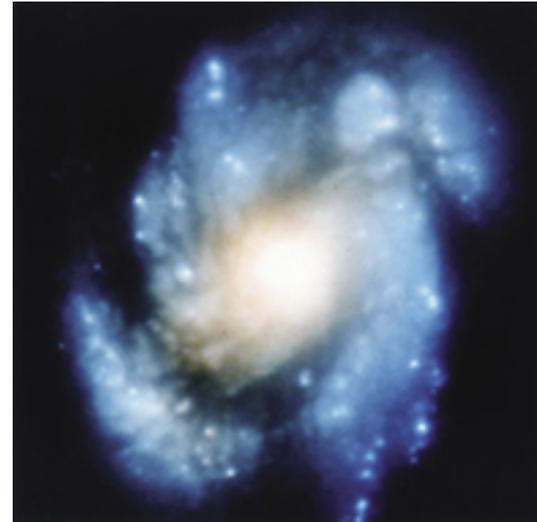




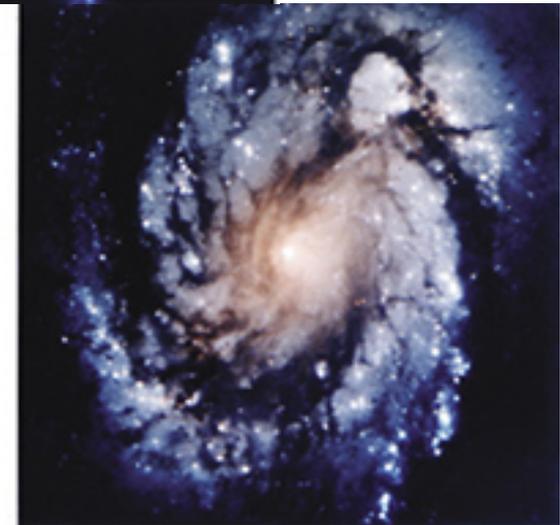
Serious Material Cause Issues*



Tacoma Narrows Bridge

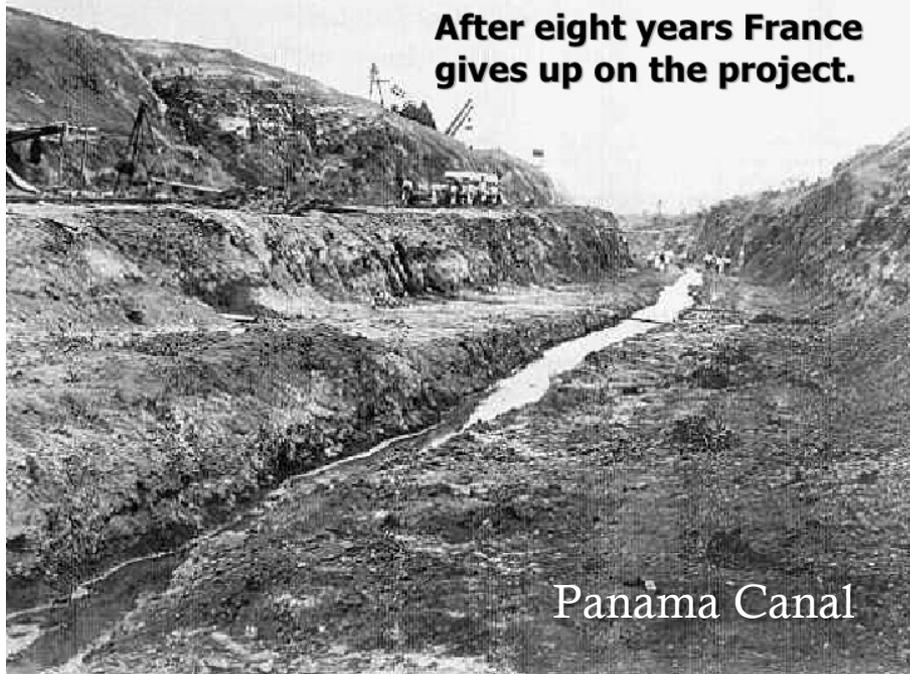


Hubble
Mirror



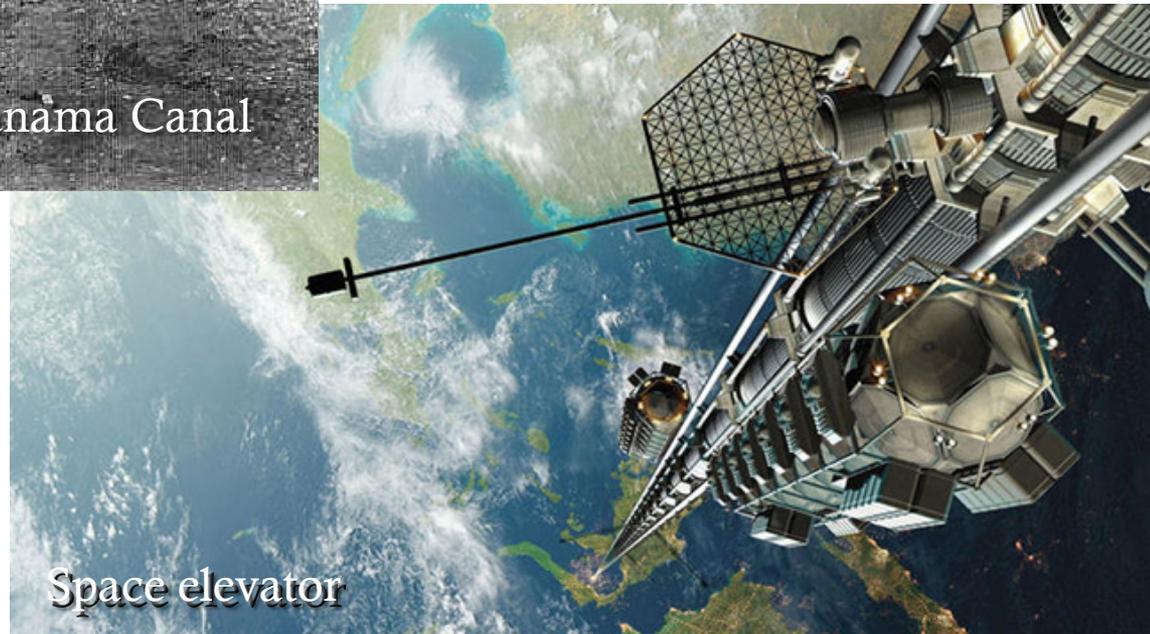


Efficient Cause Issues



After eight years France gives up on the project.

Panama Canal



Space elevator



Formal Cause Issues

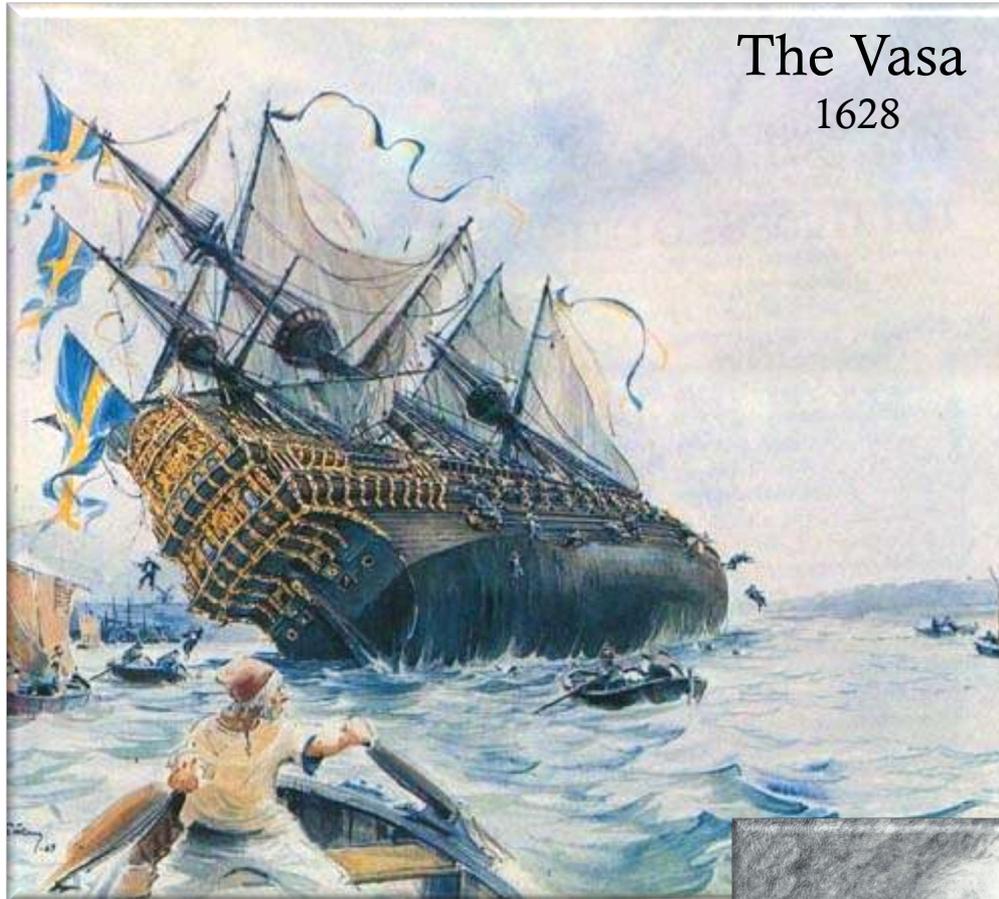


Where Formal cause issues often end up





Serious Issues from Final Cause

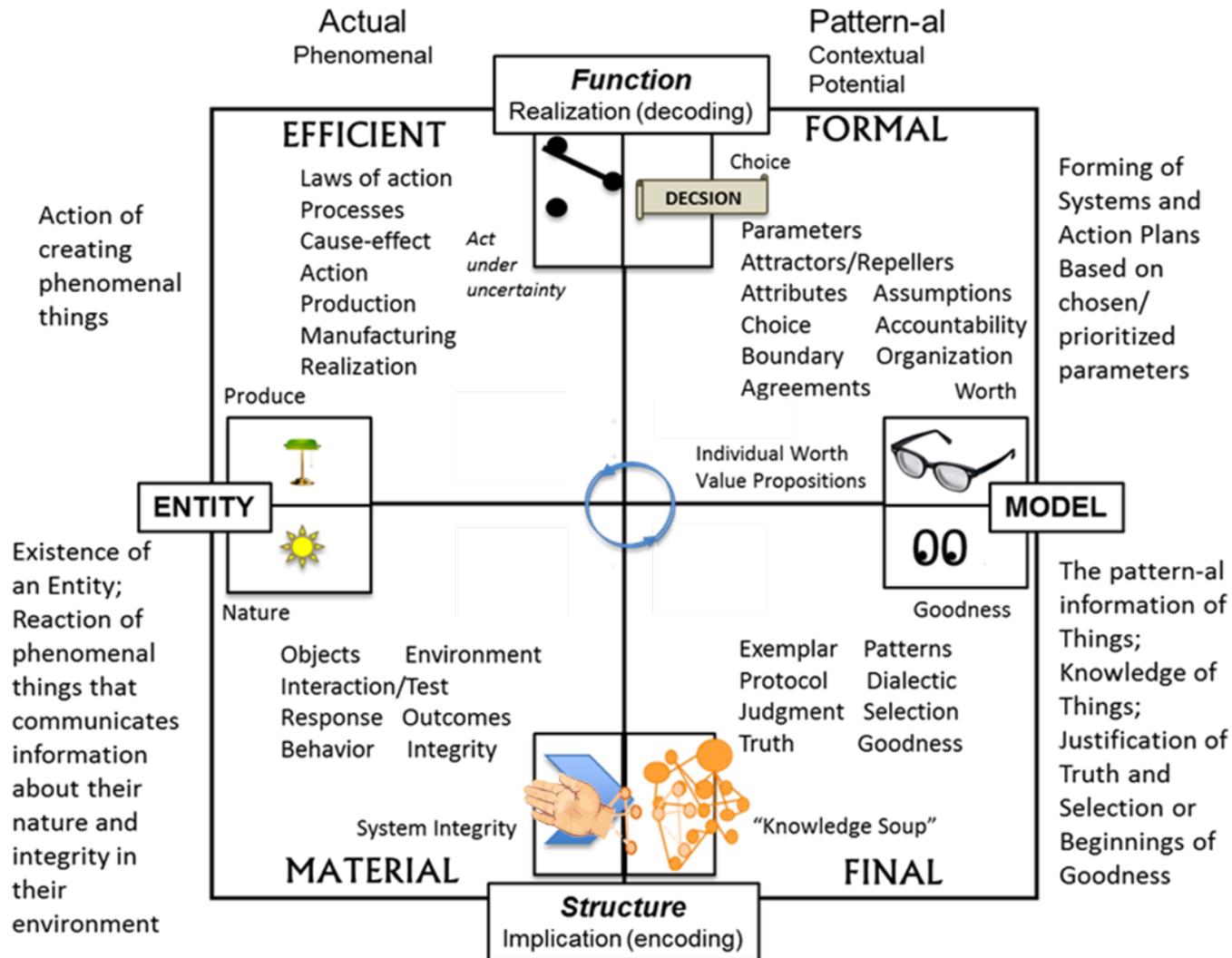


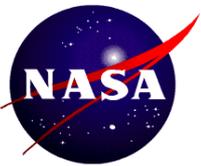
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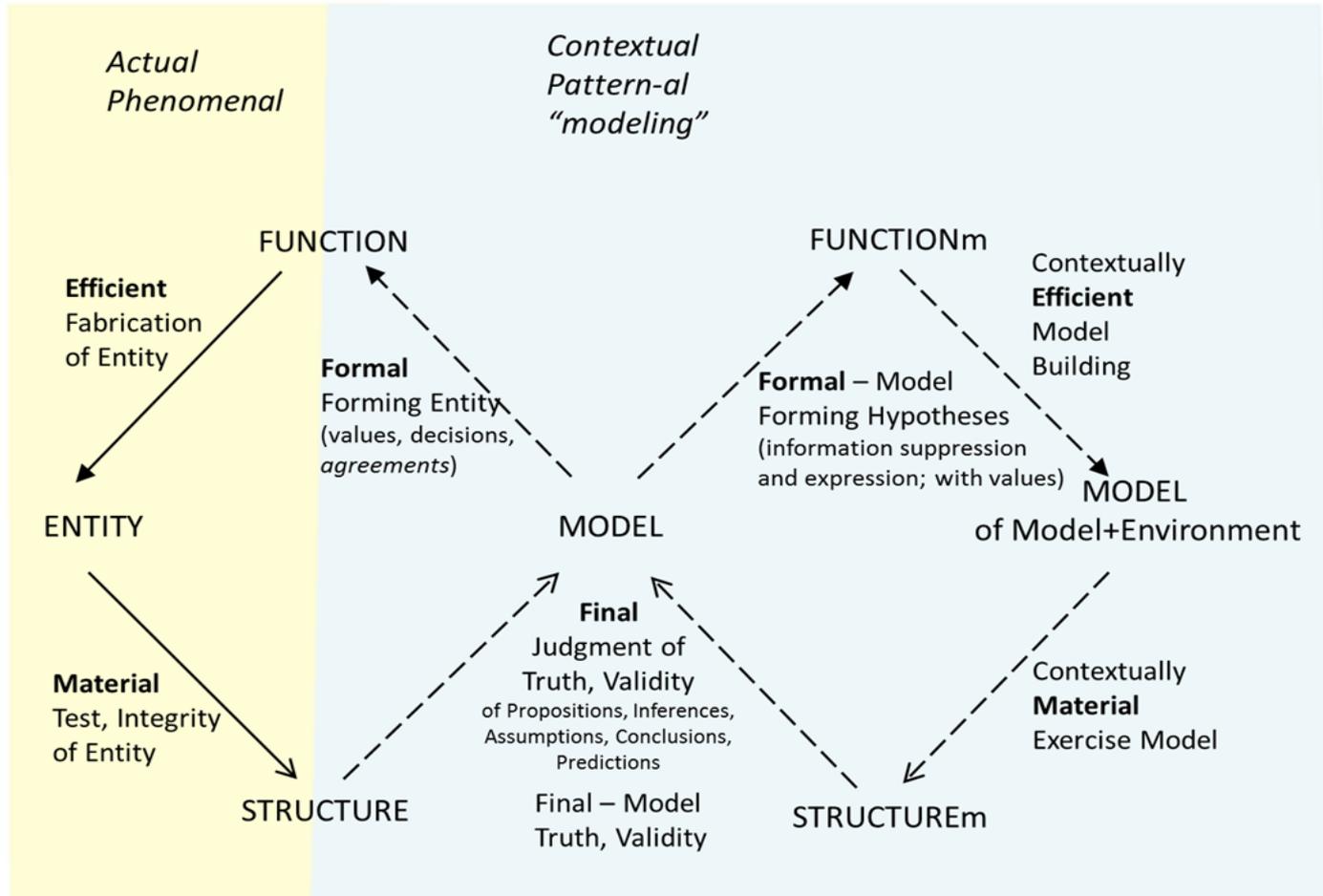


Static Model → Dynamical Model





Partial Model of Closure to Final Cause





Research in How We Know

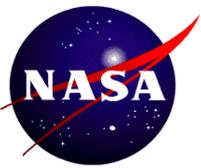
- Not focused on what we know
- Culture knobs not being turned now
- Accountability for solutions
- Case studies that illustrate authority accountability influencing go-no go decisions



Questions?



BACK UP



Most Succinct Causal Categories Explanation from Philosophy Sources

<p style="text-align: center;">EFFICIENT</p> <p>the causer of the action or the “triggering action or motion that begins the thing”;</p> <p>1) “That from which, although <i>not present in it</i>, a thing first comes into being, and that from which motion and change naturally first begin, as the child (an entity) comes from the father and mother (<i>action of other entities</i>), and fighting (<i>an action</i>) from abuse (<i>another action</i>).”</p> <p>2) The source of the first beginning of change or rest; e.g. the man who plans is a cause, and the father [<i>and mother are</i>] the cause of the child, In general <i>that which produces</i> is the cause of that which is produced, and that which changes of that which is changed.</p>	<p style="text-align: center;">FORMAL</p> <p>the forming of the thing, or what triggers the form;</p> <p>1) “That in accordance with whose <i>deliberate choice</i> that which is moved is moved, and that which is changed is changed; such as magistracies, authorities, monarchies and despotisms”</p> <p>2) the form or pattern; ..the <i>essential formula</i> and the classes which contain it the ratio 2:1 and number in general is the cause of the octave—and the parts of the formula</p>
<p style="text-align: center;">MATERIAL</p> <p>The entire material being of a thing; its shape, constitution, and phenomenal existence;</p> <p>1) “That thing as a result of whose <i>presence</i> something first comes into being; e.g., as the keel is the beginning of a ship, and the foundation that of a house, and as in the case of animals some thinkers suppose the heart to be the “beginning,” others the brain, and others something similar.”</p> <p>2) the bronze of a statue and the silver of a cup, and the classes which contain these</p>	<p style="text-align: center;">FINAL</p> <p>“the ultimate purpose or goal for which the thing exists” (the purpose); “Beginnings” (‘Cause’ can have a similar number of different senses, for all causes are ‘beginnings.’)” ‘beginning’ means the point from which a thing is <i>first comprehensible</i>, .. the <i>hypotheses</i> of demonstrations. Arts, ..especially the architectonic arts.</p> <p>2) The same as ‘end’; i.e. the final cause; e.g., as the ‘end’ of walking is health. For why does a man walk? ‘To be healthy,’ we say ... All those means towards the end which arise at the instigation of something else, as, e.g. fat-reducing, purging, drugs and instruments are causes of health”</p> <p>3) “the Good and the Beautiful”</p>

Figure 1: Explanations of Aristotle’s Four Causes. From Stanford Encyclopedia of Philosophy, “Aristotle on Causality”, <http://plato.stanford.edu/entries/aristotle-causality/>, acc. 1 Nov 2015

Soccio, DJ, Archetypes of Wisdom: An Introduction to Philosophy, 8th Ed., pp. 161-164, Cengage Learning, Boston, MA, 2013