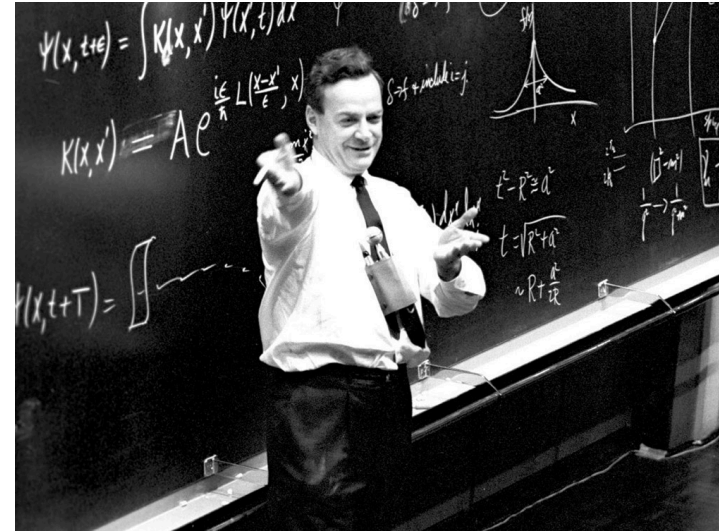


## All pretty models are wrong, but some ugly models are useful

*Wrong, but useful · Beautiful, but wrong*



“Study hard what interests you the most in the most undisciplined, irreverent and original manner possible!” —Richard Feynman

### WRONG, BUT USEFUL

Richard Feynman had a wonderful example of how a theory of physics can be extremely **useful** (i.e. it makes accurate predictions), and yet also wildly **incorrect** (i.e. it does not accurately depict how the universe works).

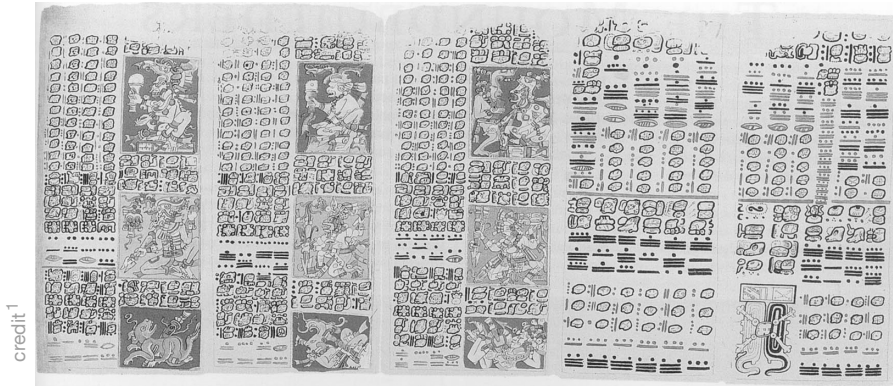
The Mayans’ model of the workings of the Earth, moon, sun, planets, and stars, were as ludicrous as any other ancient civilization, yet their priests routinely predicted the timing of eclipses with impressive accuracy. Indeed, the priests leveraged this accuracy as evidence that their religion was correct.

Their religion—and therefore their explanation of how the universe worked—is laughable to the modern reader: The Earth in the center (of course), with thirteen tiers of heaven whirling above and nine levels of

underworld threatening from below. Eclipses are not caused by physical objects blocking the light of the sun, but rather spiritual beings temporarily consuming the sun or moon. Even the most fervently religious person today would classify these tales as fanciful mythology, though the Mayans were no less certain of the veracity of their religion as humans today are of theirs.

But, they were careful observers and meticulous calculators. They understood that eclipses happened roughly every 173 days, further adjusted by a longer 405-month cycle, and other minor corrections. They tracked these cycles and updated their calculations over the centuries, and as a result, **their theory yielded accurate predictions, even though the theory’s explanation of why was entirely incorrect.**

This is a striking example of the common bromide: All models are wrong, but some models are useful. Their model was *useful* in predicting eclipses, but *wrong* in describing the universe.



Recolorized segment of the Dresden Codex,<sup>2</sup> a Mayan text from around 1200 AD which, among other things, predicts eclipses to within a few days.

Two thousand years later, modern physicists still wrestle with this challenge; in fact that was Feynman's point. Quantum Mechanics (QM) is so weird and counter-intuitive, he says, that "nobody understands quantum mechanics."<sup>\*</sup> And this is from someone who won a Nobel Prize for creating an accurate and useful model for how some of it works.

Feynman (jointly) won the prize for modeling how particles<sup>\*\*</sup> interact with each other. The model sounds crazy: It says that *all possible interactions happen simultaneously*<sup>\*\*\*</sup> (yes, "everything, all the time"), with every interaction reinforcing or cancelling-out others, and with each interaction weighted by the probability of its occurrence. When we make

<sup>\*</sup> From *The Character of Physical Law*. This is sometimes erroneously quoted as: "If you think you understand quantum mechanics, you don't understand quantum mechanics." That's a cute way to say it, but he didn't postulate that someone would even believe they understood it!

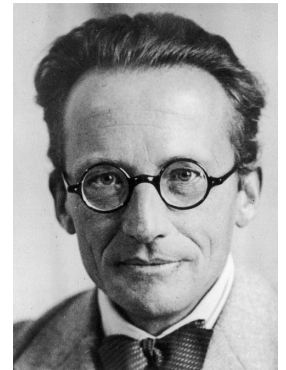
<sup>\*\*</sup> Electrons and photons specifically, but it turns out to be the right model for all types of subatomic particles.

<sup>\*\*\*</sup> The correct description is: Sum the probability amplitudes and phases over all paths the particles could have taken, including an infinite hierarchy of virtual particle interactions. I beg the reader's forgiveness for my evocative reformulation.

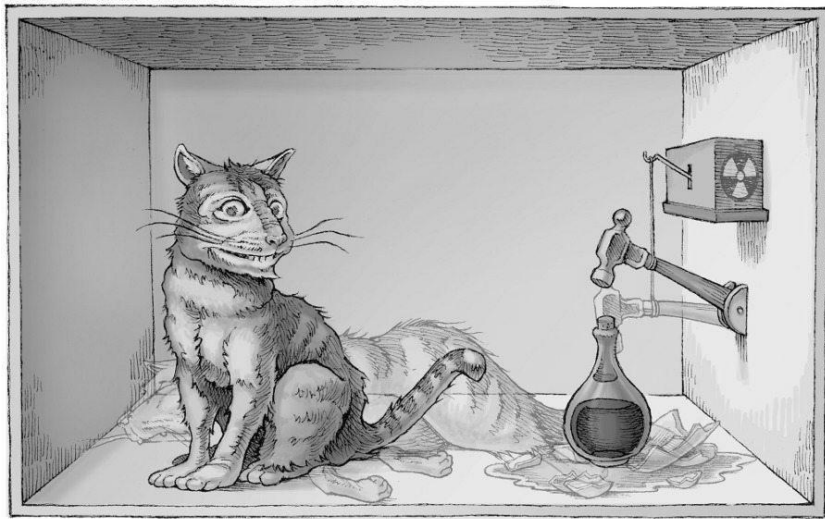
a measurement in the lab, the cosmic dice are thrown, and one of those interactions is observed to have happened in fact.

This, of course, makes no sense. This sounds like Mayan cycles that miraculously spit out the correct answer, not how the universe could really work. Albert Einstein thought as much, famously trolling "God does not play dice with the universe." To prove it he, along with Boris Podolsky<sup>3</sup> and Nathan Rosen,<sup>4</sup> described the "EPR Paradox"<sup>5</sup>—an experiment where the QM model predicts an even more "absurd, impossible" result, therefore (they felt) "proving" that the QM model is a more sophisticated kind of Mayan cycle computation, and might even be downright incorrect. Unfortunately for Einstein, physicists have run the EPR experiment many times in the subsequent decades, and the weird model has always been correct in every detail.

Erwin Schrödinger was also personally entangled with the apparent problem that the QM model was absurd, yet useful. His Schrödinger Equation<sup>7</sup> is the center-piece of QM: It dictates how the world evolves over time. Nearly every QM calculation runs through this equation. And yet, like Einstein, Schrödinger agreed that although the model is successful, its description of how the world works is ludicrous. He invented the Schrödinger's Cat<sup>8</sup> example to prove that QM must be wrong, just as Einstein attempted with EPR. And, like Einstein, this attempt failed; physicists have run this experiment dozens of ways over nearly a hundred years, and the model has always been correct.



Erwin Schrödinger in 1933

credit<sup>9</sup>

The QM model says that Schrödinger's cat is simultaneously alive and dead until you look inside the box; another example of "everything happens, but with probability, resolved when you observe it." Both the "simultaneously" and "when you observe it" are nonsensical concepts (how does the cat-system "know" that some human-system "observed" it?), yet hundreds of experiments have confirmed the predictions of the model.

## BEAUTIFUL, BUT WRONG

And so we come to models of companies, markets, and people.

Economics, modeling how companies work in isolated, simple paradigms (micro) or in bulk (macro). Management theory, modeling how information and control and human behavior flows across organizations. Strategy theory,<sup>10</sup> modeling a company's most important constraints and levers, strongest capabilities and assets, modeling competitors and the market at large, resulting in the top-level decisions that will bring success. Product Management,<sup>11</sup> modeling customers' whims, incentives, "pain-points," "delighters," "JTBD," and willingness-to-pay.<sup>12</sup> Startup theory, giving frameworks for methodically transforming an idea into profit<sup>13</sup> while avoiding failure.<sup>14</sup>

All of these work some of the time. All purport to explain the past retroactively, and do so far better than they predict the future, and thus none are on par with theories of physics. A company is not an experiment<sup>15</sup> with controlled variables and many trial-runs. Even using "expected value" is a fallacy.<sup>16</sup>

Are these models more like the Mayans or more like physics? Are they occasionally useful but not representative of how the world actually works, or do they indeed imperfectly model how the world operates, being incorrect not because of their structure, but because of noisy environments, faulty inputs, missing inputs, or human operators who are more interested in selling consulting on the backs of HBR articles and books than they are in acknowledging the limits of our simplistic models in the face of an irreducibly complex world?

**This is partly how I judge frameworks: Does the framework appear to mirror how the world really works, or does it seem like a fantasy that looks nice on paper?**

For example, I immediately discount any framework about human beings that comes packaged in a nice, symmetric diagram, with exactly identical quantities of bullets and sub-categories (Figure 1).

Human beings are more complex than saying "there are four categories, and each of the four have exactly six subcategories of descriptors, and each of *those* have an identical number of components." No, that's never how it is with people. If you had said there are five major categories, and some don't subdivide, while others are complex, and some are fairly well understood, while others are still a mystery, I'd believe that you were trying to model reality instead of ensuring some picture had 90° rotational symmetry.

A more accurate model of human activity is seen in Craig's List, where they have however many categories, and however many subcategories (Figure 2).

Human emotion had better *not* be modelled as some perfectly-symmetrical list. In 1980 Dr. Robert Plutchik created a better model,

D	I	S	C
Problem Solve	People	Plan	Procedures
Competitive Assertive Daring Ambitious Directive Expedient	Demonstrative Enthusiastic Gregarious Intense Optimistic Persuasive	Systematic Stable Patient Peaceful Accommodating Team Player	Accurate Analytical Exacting Factual Precise Logical
Decisive Risk-taker Goal oriented Pioneering	Expressive Charming Collaborative Sociable	Consistent Cooperative Loyal Supportive	Careful Data Driven Investigates High Standards
Deliberate Determined Self-reliant Concise	Trusting Confident Friendly Generous	Relaxed Composed Calming Courteous	Focused Detail Oriented Pragmatic Conventional
Calculated Risks Unassuming Rational Thoughtful	Poised Modest Reserved Subtle	Active Change Oriented Eager Spontaneous	Firm Challenges Self-assured Independent
Reflective Contemplative Hesitant Seeks Information	Introspective Moderate Restrained Private	Energetic Carefree Vigorous Variety Oriented	Autonomous Open-minded Conceptual Adventurous
Tentative Prudent Judicious Balanced	Understated Inconspicuous Sympathetic Discreet	Tenacious Energetic Animated Unstructured	Experiments Approximates Exploratory Progressive

Figure 1: The DISC personality assessment

designed to help his patients identify their feelings and where they stem from—quite useful! It is suspicious in that every second-level category contains exactly two third-level emotions, but at least the first-level categories are of vary in size (Figure 3).

Another red flag is any list with exactly 10 items.<sup>17</sup> That’s how many fingers we have, not how many things should probably be on that list.\*

\* Unless “ten” truly is significant, for example if you have exactly 10 teams, and this is the list of each team’s top priority. Or if it’s arbitraryness is implies, like James

community	housing	jobs
activities artists childcare classes events general groups local news	lost-found missed connections musicians pets politics rants & raves rideshare volunteers	apts / housing housing swap housing wanted office / commercial parking / storage real estate for sale rooms / shared rooms wanted sublets / temporary vacation rentals
accounting+finance admin / office arch / engineering art / media / design biotech / science business / mgmt customer service education etc / misc food / bev / hosp general labor government human resources		
services	for sale	legal / paralegal manufacturing marketing / pr / ad medical / health nonprofit sector real estate retail / wholesale sales / biz dev salon / spa / fitness security skilled trade / craft software / qa / dba systems / network technical support transport
automotive beauty cell/mobile computer creative cycle event farm+garden financial health/well household	labor/move legal lessons marine pet real estate skilled trade sm biz ads travel/vac write/ed/tran	antiques appliances arts+crafts atv/utv/sno auto parts aviation baby+kid barber beauty+hilth bike parts bikes boat parts boats books business
discussion forums		
apple arts atheist autos	frugal gaming garden haiku	philos photo politics psych

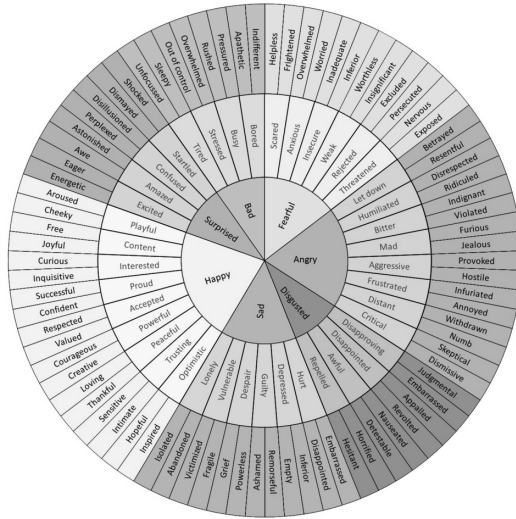
Figure 2

Instead, my lists of things like what goes into a great strategy<sup>10</sup> or deciding whether an investment is worthwhile<sup>19</sup> contain however many items make sense. Or in this analysis of why startups fail,<sup>14</sup> the categories and quantity of bullets under each category are imbalanced. Or my system for PMF<sup>13</sup> has steps of varying length and detail, and even gives counter-examples to show how it’s an interesting guide but not a law.

And so on with other models. If you’re modeling human organization, does it reflect the complexity and capreciousness of real humans, the good and bad incentives and emotions, the different personalities and ways those react to the world, or is it modeled as if people are fungible worker-units with predictable responses to stimuli, built by a professor who has never managed a team beyond six sycophantic grad students?

Does the model of strategy fit into 2x2s and symmetric diagrams, with rubric scoring, with the same questions for all companies of all stages

Altucher’s 10 ideas every morning<sup>18</sup> exercise, where it’s understood that the number is not an essential part of the process.

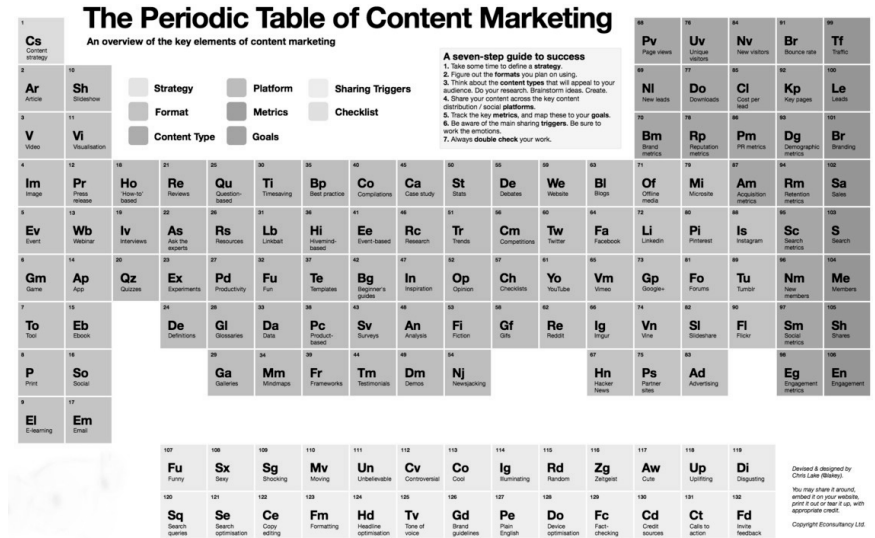


**Figure 3:** Dr. Robert Plutchik’s “Feelings Wheel”  
 Plutchik, Robert. “A General Psychoevolutionary Theory of Emotion.” Theories of Emotion, edited by Robert Plutchik and Henry Kellerman, Academic Press, 1980, pp. 3–33.

in all industries in all markets? Or does it grapple with the complexity of interacting systems of markets, customers, competitors, alternatives, employees, technology, products, and global trends, each dynamic, each affecting the others, each unknowable and unquantifiable along some of their most important dimensions?

I trust more in diagrams that aren’t balanced, symmetrical, or even pretty, because perhaps they’re primarily interested in modeling the messy truth of the world, like Figure 5 and Figure 6.

All models are wrong, but some are useful. The most useful are the ones that genuinely attempt to model the real, complex, ugly, asymmetric world, not the ones made to look pretty on slides and brochures for consulting services.



**Figure 4:** Obviously “marketing” does not have exactly these quantities of these things.

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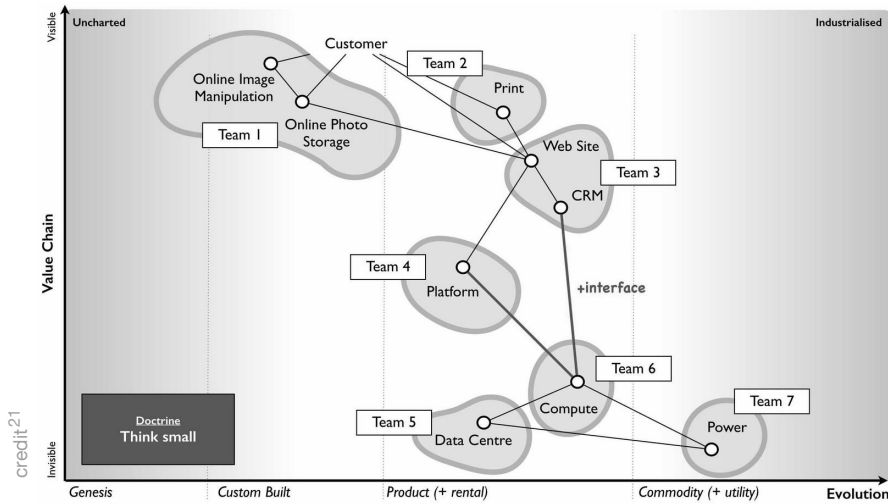
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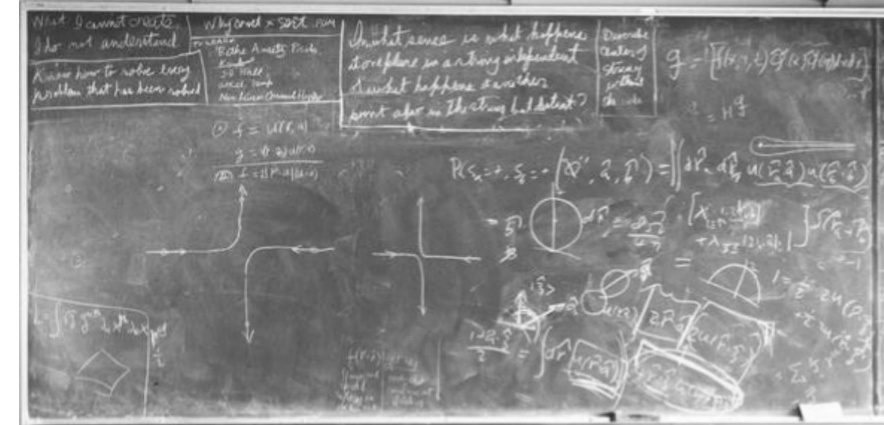
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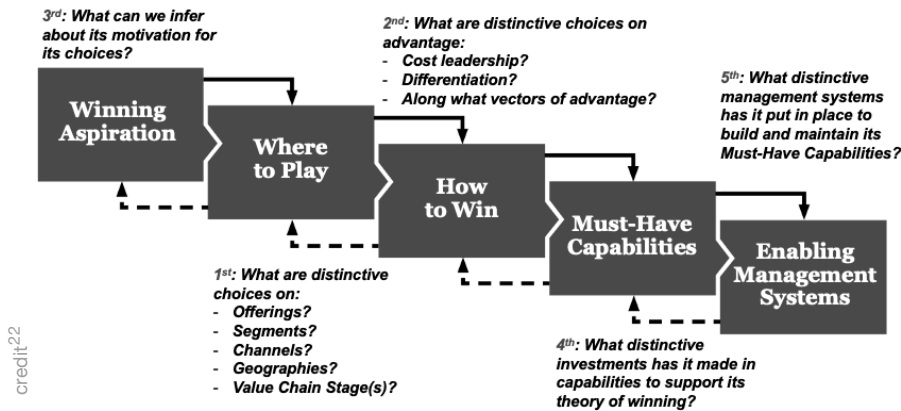


**Figure 5:** Wardley diagram, sussing out which activities support growth and differentiation, and which are necessary but commoditized, so that teams can respond with different kinds investments and actions.



Feynmann’s blackboard when he died. The boxed statements at top-left are: “What I cannot create, I do not understand” and “Know how to solve every problem that has been solved”

### Reverse-Engineering a Competitor’s Strategy



**Figure 6:** Though Roger L Martin’s slide has “five boxes,” the instructions have “however many questions are useful,” and the order of operations is non-linear.

4. [https://en.wikipedia.org/wiki/Nathan\\_Rosen](https://en.wikipedia.org/wiki/Nathan_Rosen)
5. [https://en.wikipedia.org/wiki/EPR\\_paradox](https://en.wikipedia.org/wiki/EPR_paradox)
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