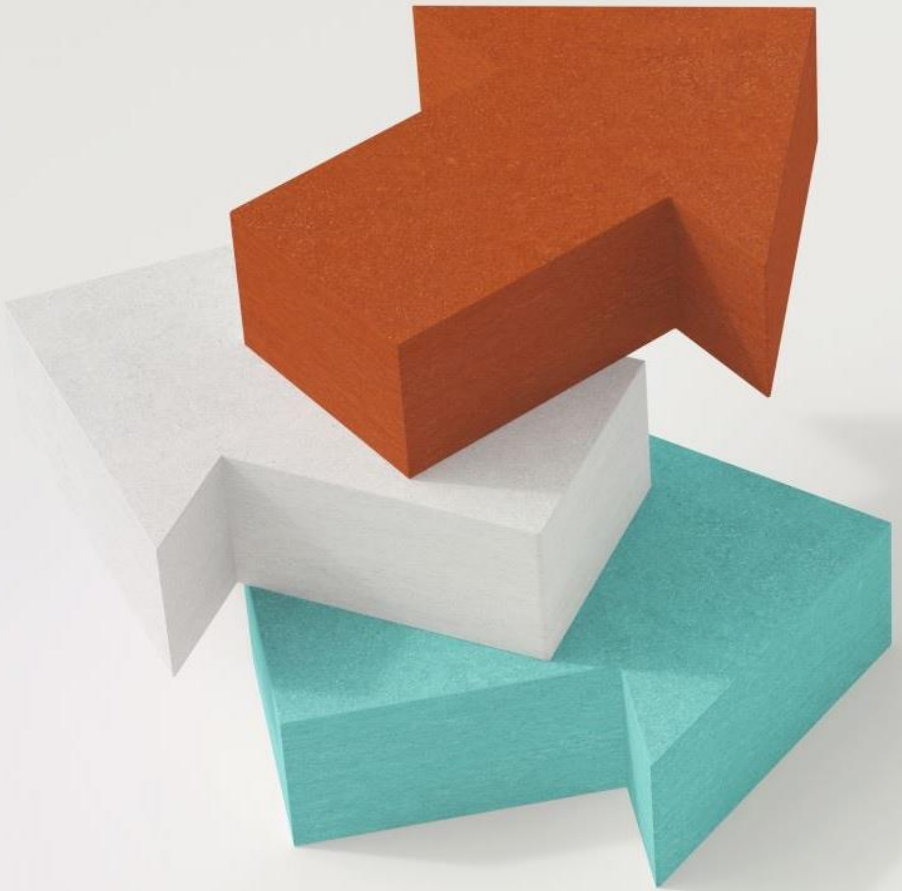
Hamed Khalkhali, Ph.D.

Vice President – Engineering

Swift Tactical Systems

QUANTITATIVE STRATEGIC DECISION MAKING



- We are always making decisions. Some are important with serious consequences
- We have learned that making incorrect decisions could cost our existence
- In social relationships, we constantly base our decisions on our false belief systems
- In business, we cannot make decisions based on previous experiences
- At work, repetitive situations are seldom
- Trial and error decision making is not competitive
- For 50,000 years, we have learned to make quick decisions to save ourselves

✓ History and nature are full of incorrect decisions
✓ Many scientists have been killed in duels
✓ Photosynthesis has only 3% efficiency
✓ People make unhealthy choices daily regardless of their knowledge

Now, in the past 400 years, we have confronted new situations that are unique

Why

Strategic

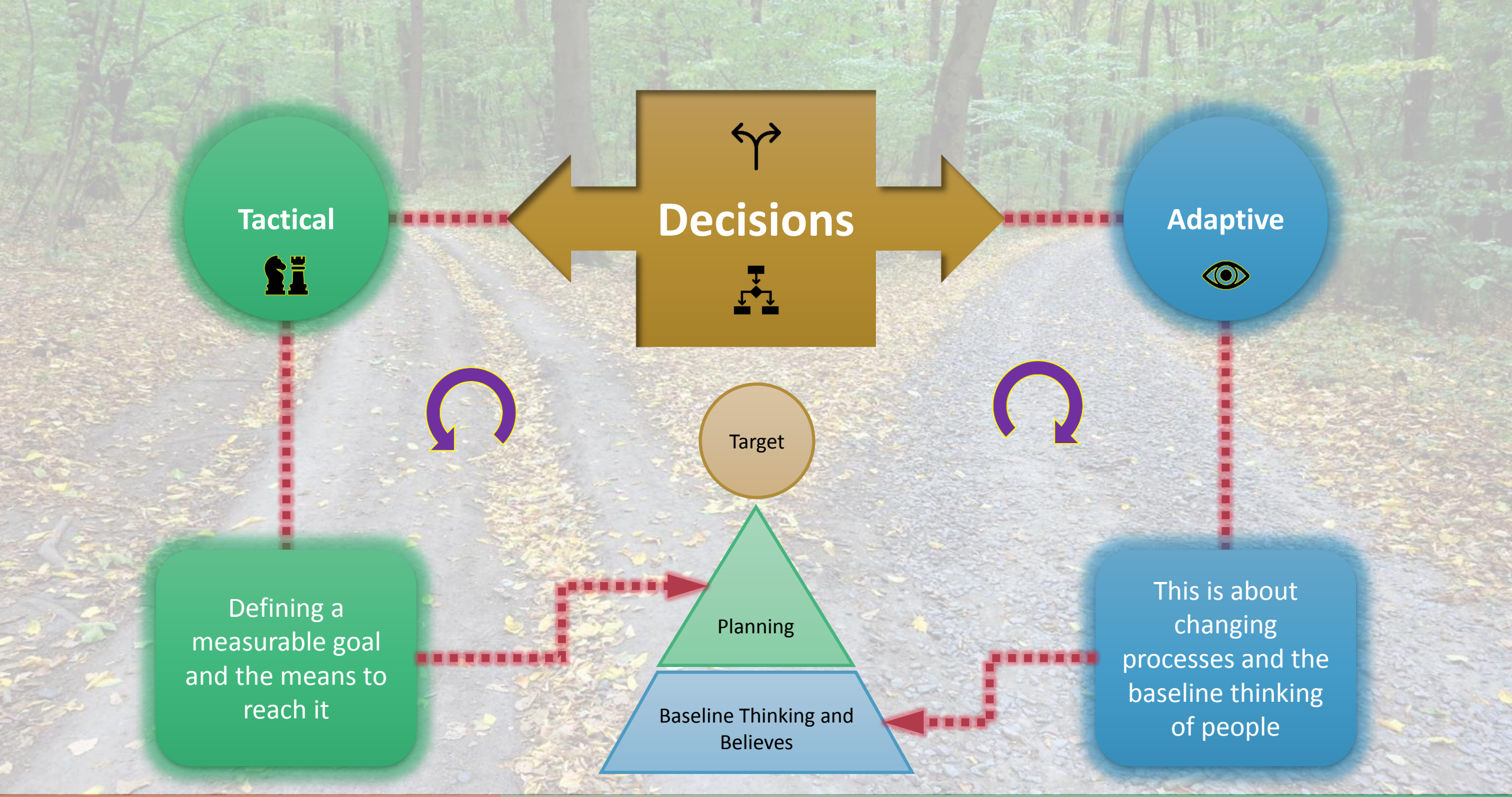
- Strategy, art of troop leader, is a general plan to achieve one or more long-term or overall goals under conditions of uncertainty.
- Strategy is important because the resources available to achieve goals are usually limited.

Quantitative

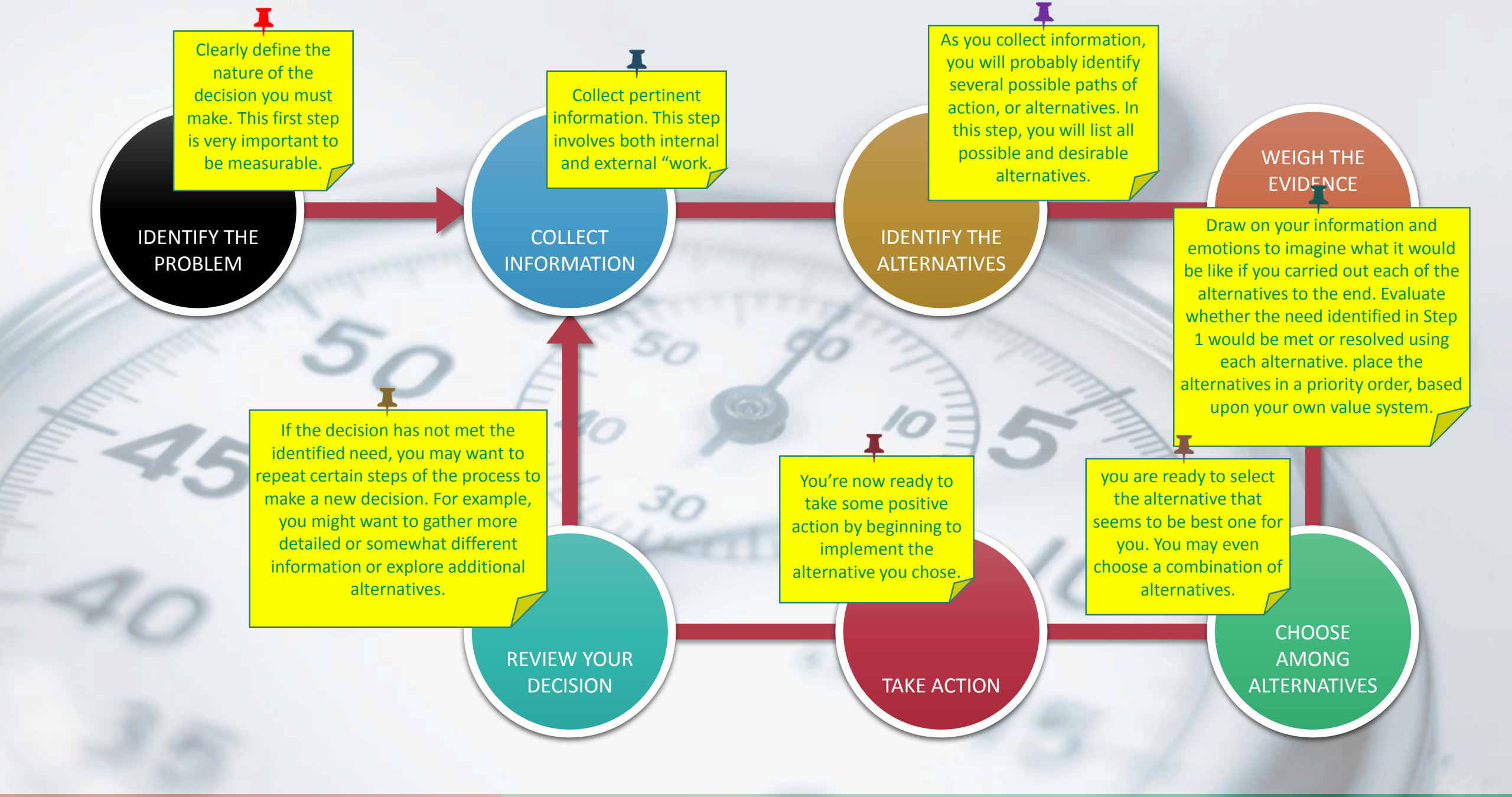
- The objective of quantitative research is to develop and employ mathematical models, theories, and hypotheses pertaining to phenomena yielding an unbiased result that can be generalized to some larger population.

Decision Making

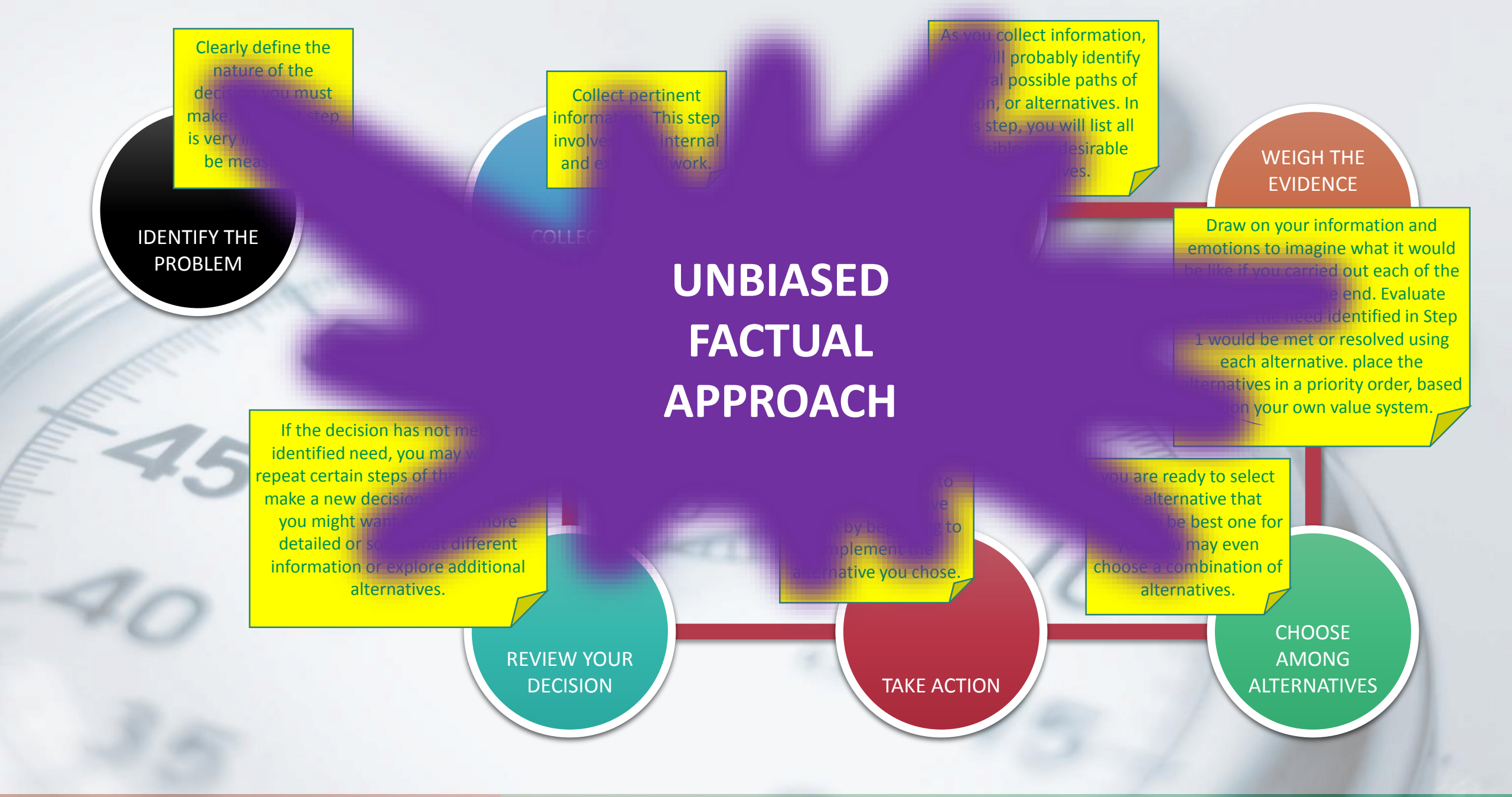
- Decision-making can be regarded as a problem-solving activity yielding a solution deemed to be optimal, or at least satisfactory.
- Usually both, tacit and explicit knowledge, are used together in the process.

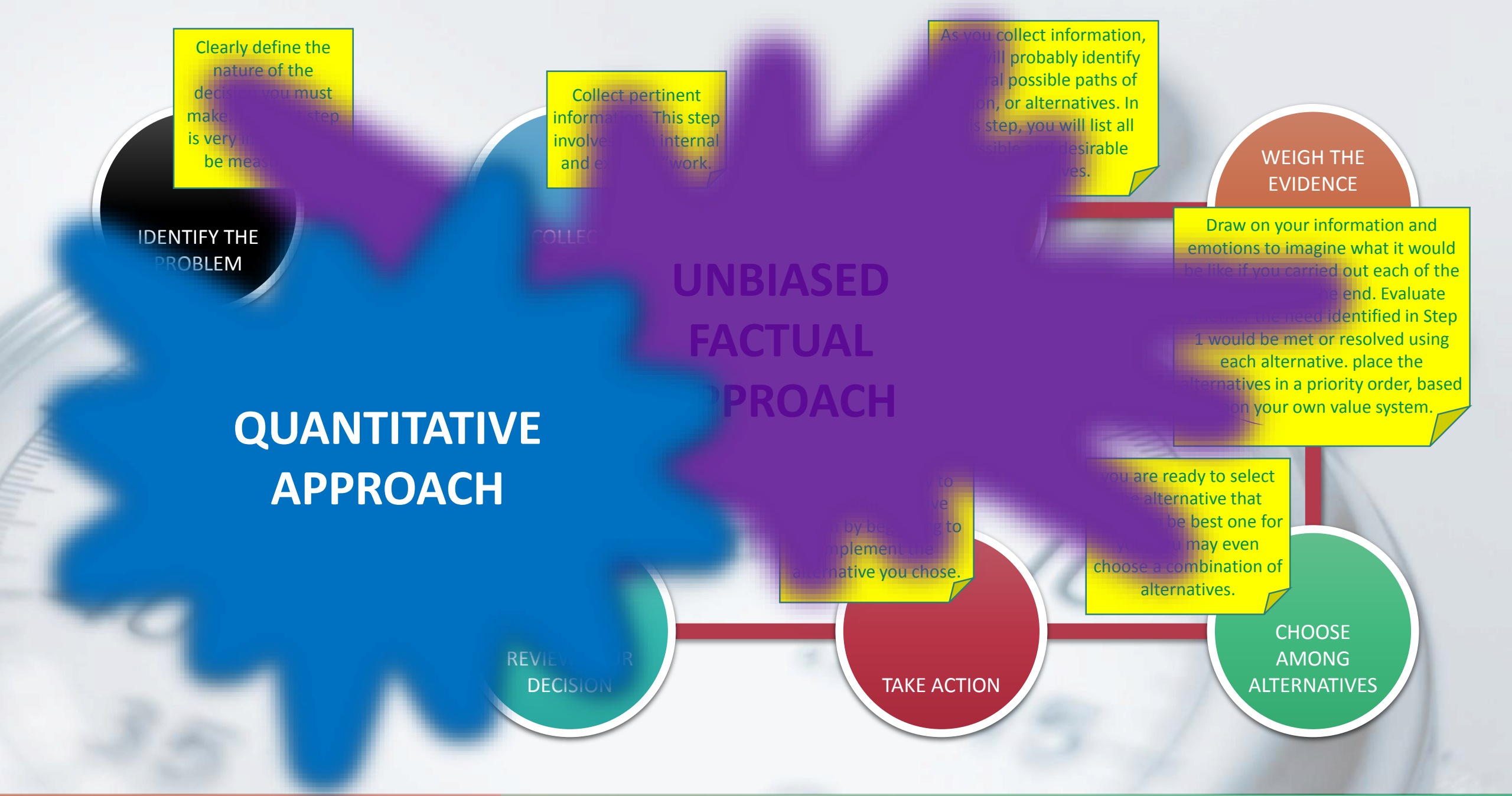

Decisions
Tactical
Adaptive
Target
Planning
Baseline Thinking and Believes
Defining a measurable goal and the means to reach it
This is about changing processes and the baseline thinking of people


IDENTIFY THE PROBLEM
COLLECT INFORMATION
IDENTIFY THE ALTERNATIVES
WEIGH THE EVIDENCE
CHOOSE AMONG ALTERNATIVES
TAKE ACTION
REVIEW YOUR DECISION


Clearly define the nature of the decision you must make. This first step is very important to be measurable.
IDENTIFY THE PROBLEM
Collect pertinent information. This step involves both internal and external “work.
COLLECT INFORMATION
As you collect information, you will probably identify several possible paths of action, or alternatives. In this step, you will list all possible and desirable alternatives.
IDENTIFY THE ALTERNATIVES
WEIGH THE EVIDENCE
Draw on your information and emotions to imagine what it would be like if you carried out each of the alternatives to the end. Evaluate whether the need identified in Step 1 would be met or resolved using each alternative. place the alternatives in a priority order, based upon your own value system.
you are ready to select the alternative that seems to be best one for you. You may even choose a combination of alternatives.
CHOOSE AMONG ALTERNATIVES
You’re now ready to take some positive action by beginning to implement the alternative you chose.
TAKE ACTION
If the decision has not met the identified need, you may want to repeat certain steps of the process to make a new decision. For example, you might want to gather more detailed or somewhat different information or explore additional alternatives.
REVIEW YOUR DECISION

UNBIASED FACTUAL APPROACH

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REVIE R DECISION
TAKE ACTION
CHOOSE AMONG ALTERNATIVES

WHAT CAN BE MEASURED?

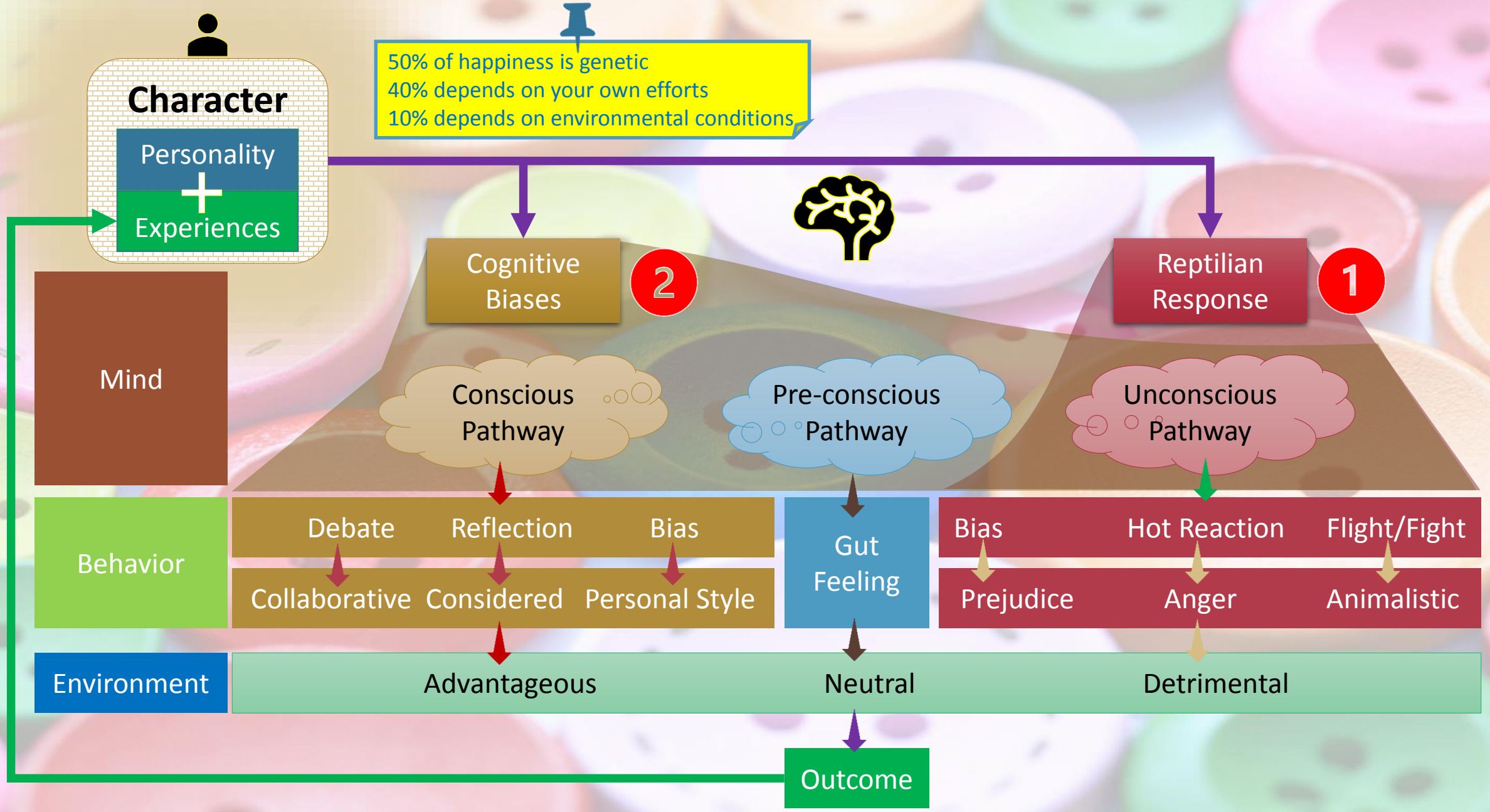
. . . Everything

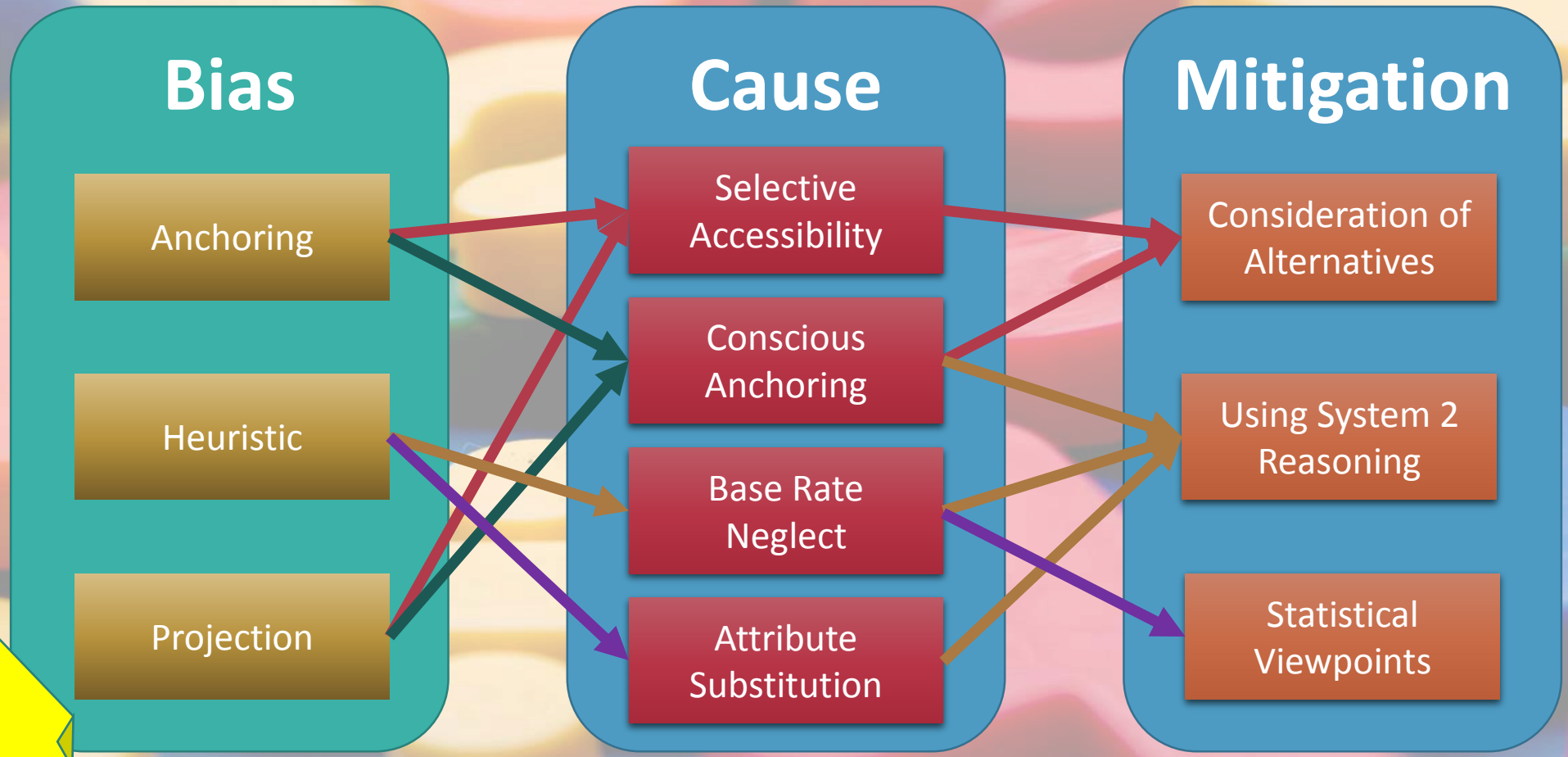
Time is the most abstract concept, yet it is being measured.

If you cannot measure it, that does not mean, it is not measurable.

How do I measure performance?

Define performance


Character
Personality
+
Experiences
50% of happiness is genetic
40% depends on your own efforts
10% depends on environmental conditions
Cognitive Biases
2
Reptilian Response
1
Mind
Conscious Pathway
Pre-conscious Pathway
Unconscious Pathway
Behavior
Debate
Reflection
Bias
Collaborative
Considered
Personal Style
Gut Feeling
Bias
Hot Reaction
Flight/Fight
Prejudice
Anger
Animalistic
Environment
Advantageous
Neutral
Detrimental
Outcome



There are more than 18 items for Biases

Anchoring

Anchoring bias occurs when people rely too much on pre-existing information or the first information they find when making decisions. For example, if you first see a T-shirt that costs $1,200 – then see a second one that costs $100 – you're prone to see the second shirt as cheap. Whereas, if you'd merely seen the second shirt, priced at $100, you'd probably not view it as cheap. The anchor – the first price that you saw – unduly influenced your opinion. Anchoring bias is an important concept in behavioral finance.

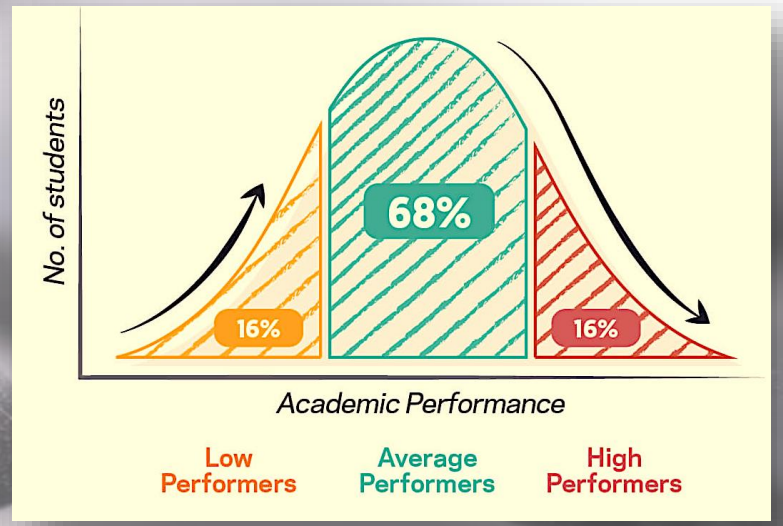
Heuristic

Imagine you are considering either John or Jane, two employees at your company, for a promotion. Both have a steady employment record, though Jane has been the highest performer in her department during her tenure. However, in Jane's first year, she unwittingly deleted a company project when her computer crashed. The vivid memory of having lost that project likely weighs more heavily on the decision to promote Jane than it should. This is due to the availability heuristic, which suggests that singular memorable moments have an outsized influence on decisions.

Projection

Imagine that you are starving and go to the grocery store to get some food. You might load up your cart with heaps of snacks: chips, chocolate, pizza, crackers. You get home, pop the pizza in the oven and start eating some other things you bought while it cooks. When the pizza is done, you realize you're not hungry anymore. How can that be — you were starving! Now you have all this junk food that you don't even want anymore.

Everything is possible, just with different probabilities.



Statistical Data

Crowd Sourcing

Guts Feeling

Confidence Calibration

Bias Adjustment

Outcome Range

Identify Variables

Rank Them

Utilize the Top Ones

Independency

Performance | Trustworthy

Performance

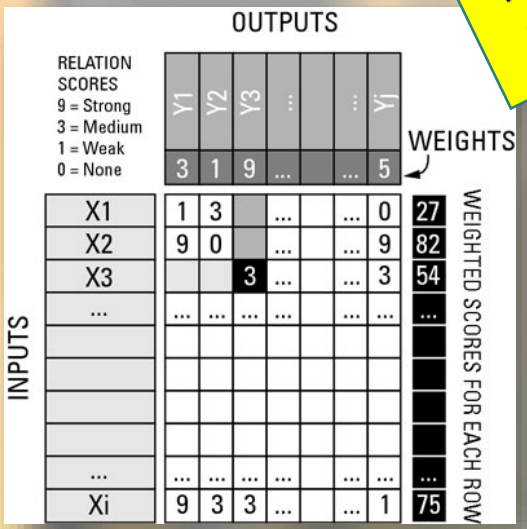
Trustworthy

Six Sigma Methodology

	A	B	C	D	E
A		A	A	D	A
B			B	D	E
C				D	E
D					D
E					

Value Proposition

Utilize minimum number of variables.



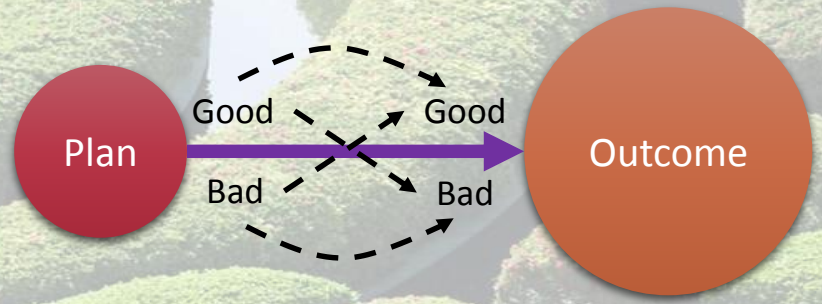
Strategy is the path from VISION to SUCCESS

System & Process

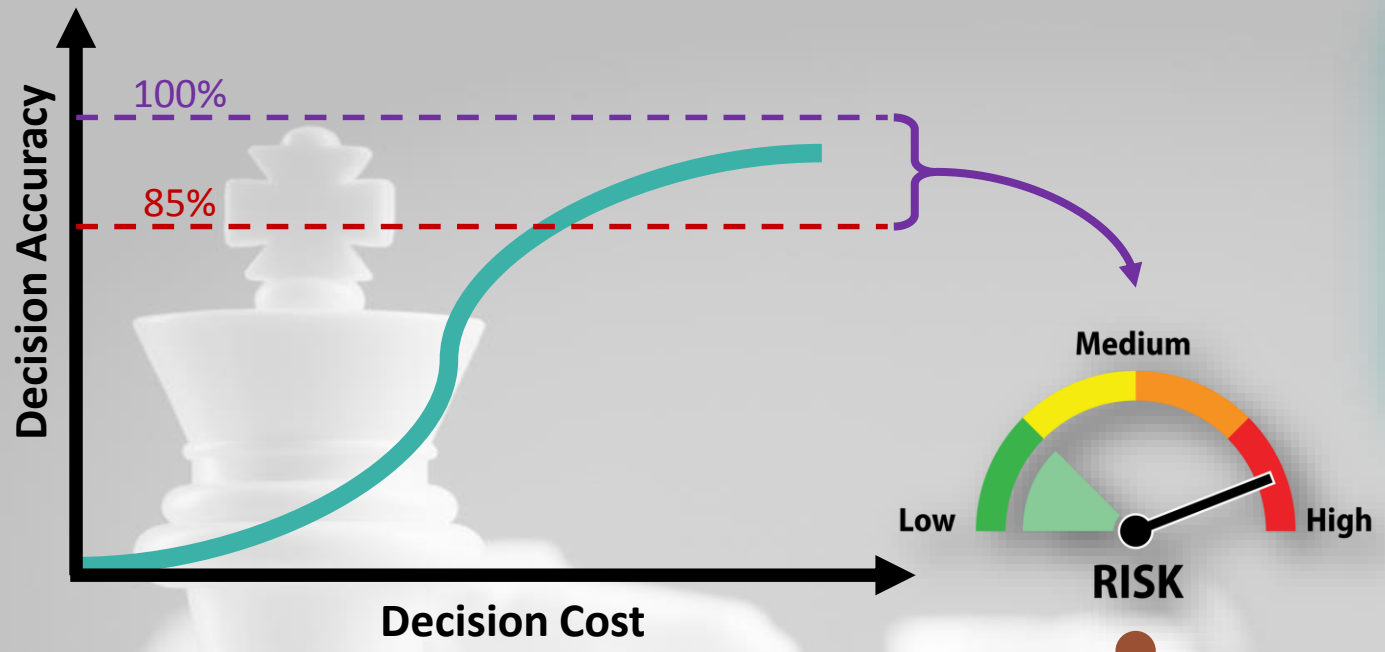
- Org Chart
- Processes
- Infra-structure

People & Culture

- Recruitment
- Retention
- Compensation
- Motivation
- Leadership



Depends on Strategy	Outcome	
Plan	Good Good	Good Bad
	Bad Good	Bad Bad



Unmanaged Risks

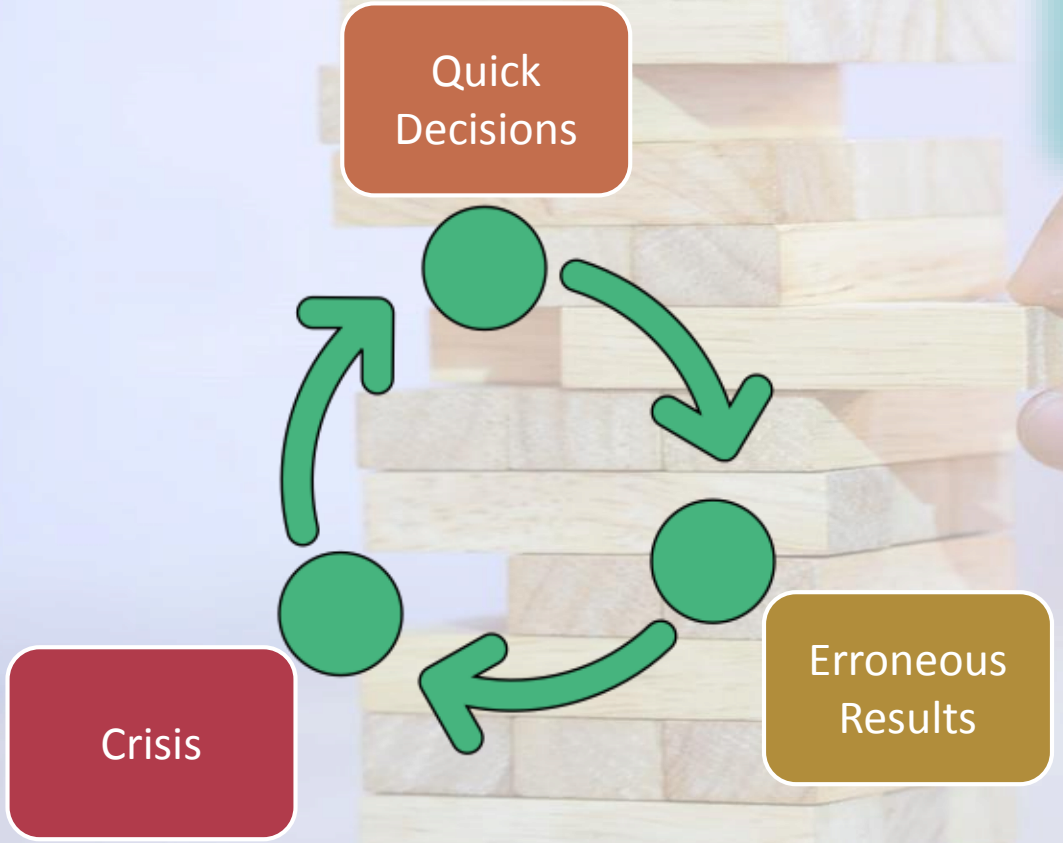
Crisis

We have been told systematically, that strategy is a game of CHESS. In Reality, it is a game of POKER.

If it is played under CHESS mentality, it has a higher probability of not being successful.

Success = Hard Work + Luck
More Success = Little More Hard Work + A Lot More Luck

Crisis forces managers to make quick decisions resulting in undesirable outcomes contributing to more crisis.



- Have Crisis Management Plan ready and updated to be used in short notice
- Avoid rush decision
- Delegate data gathering to experts identified in advance
- Have a mitigation plan for each quick decision you have to make
- Get good at playing what-if scenarios with your team
- Be Resilient and Vigilant

Identifying Risks and Threats

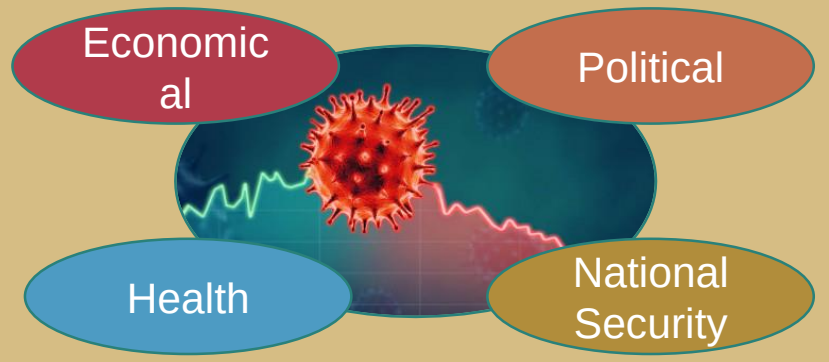
Risk Avoidance

Risk Reduction

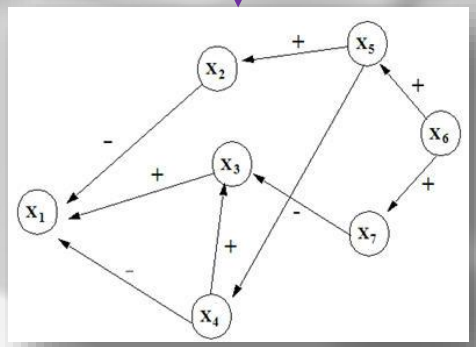
Risk Management

Business Continuity

Break to smallest possible variables



Build Complex Model from Simple Models

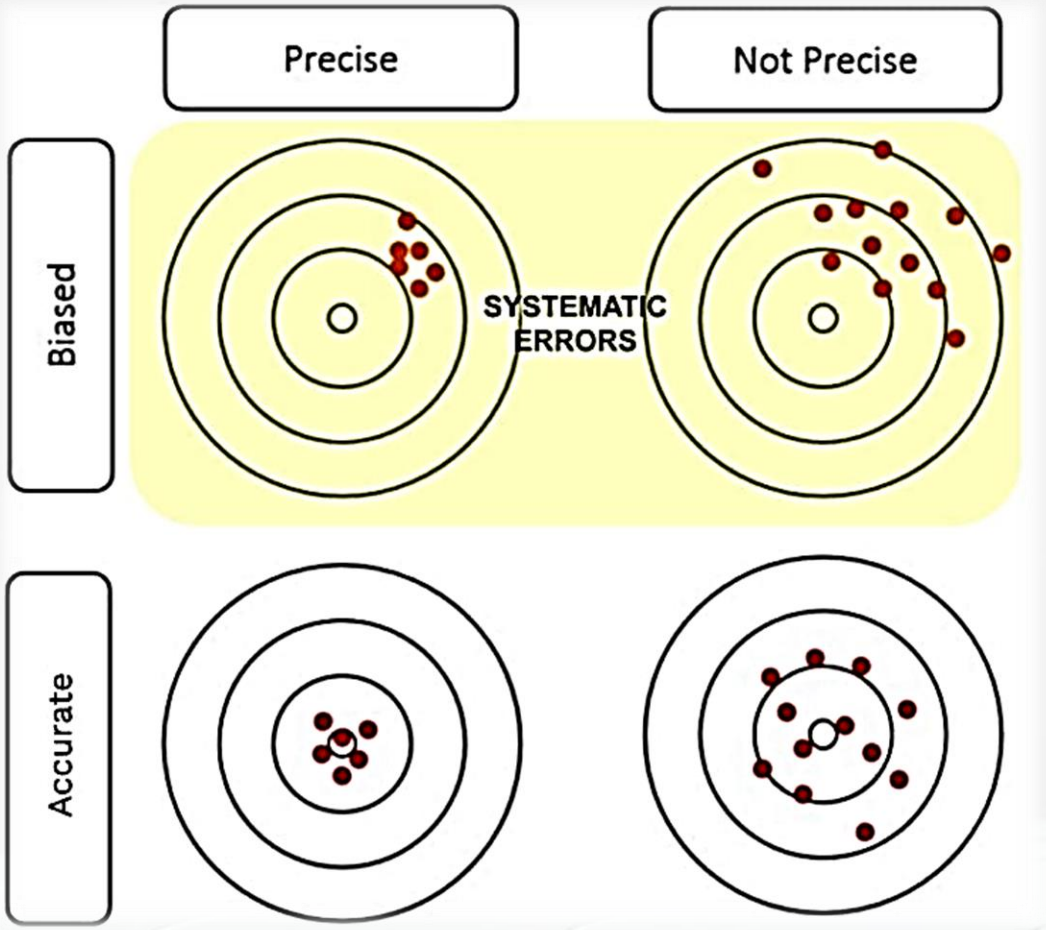


Analysis
- Traditional Linear Models
- Evolutionary Statistical Models (Bayesian)
- Game Theory
- Artificial Intelligence

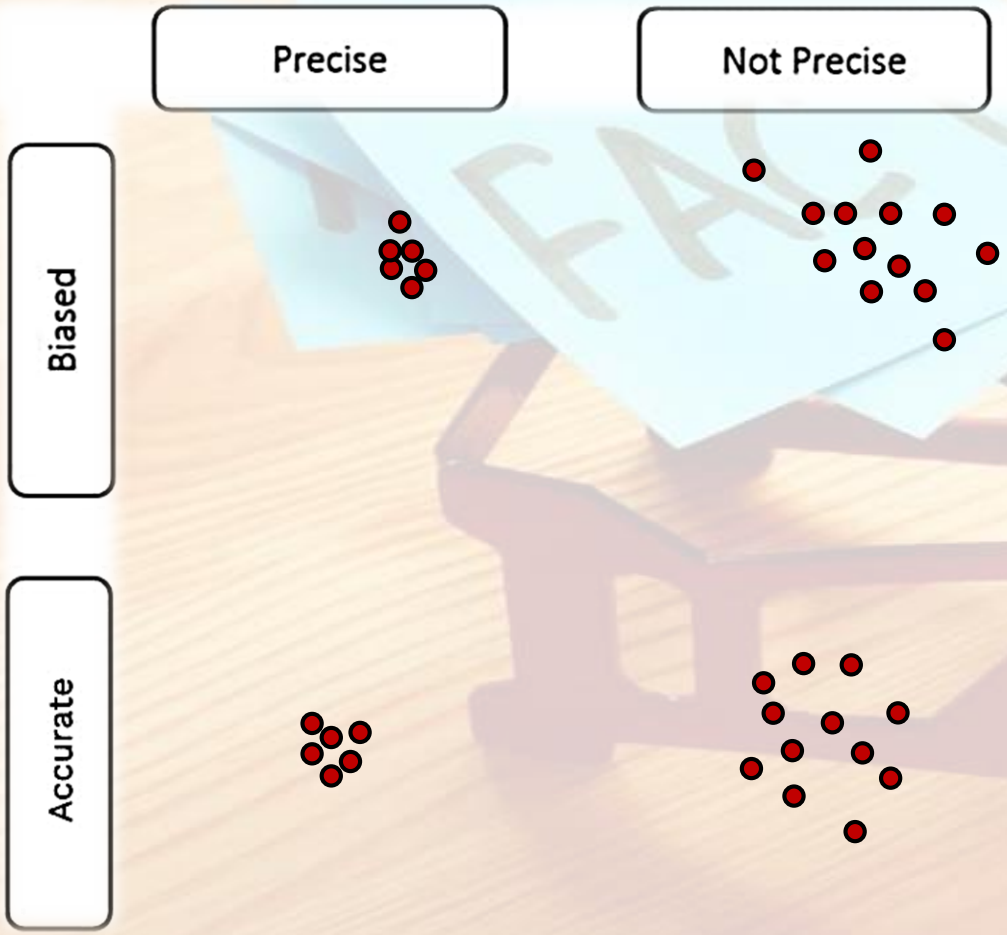
A simple model with known accuracy is better than a complex model with unknown certainty

1. Determine what types of decision is needed (Tactical, Adaptive, …)
2. Collect information (Crowd, Statistical, …)
3. Quantify the goals (Measure intangibles)
4. Create analytical models (Simple, Complex, …)
5. Run what-if scenarios
6. Analyze the results (Traditional, Artificial Intelligence, …)
7. Modify your decision based on obtain results
8. Continue updating the data as new information is obtained and run the model

Successful Leader → Business Knowledge + Analytical Skills + Knowledge in Psychology



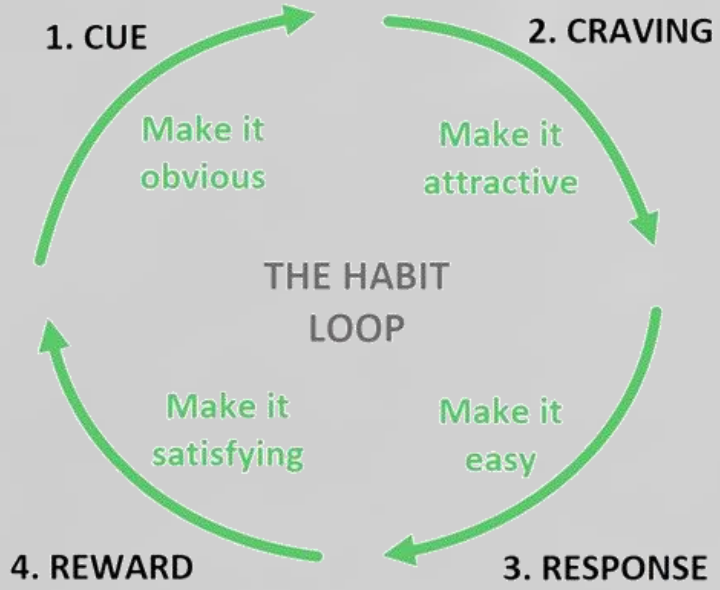
- Biases has served us well over thousands of years to protect us from harms.
- A bad or good experience is converted to a pre-existing conditions for future decision making
- Our default thinking is always tilted toward a specific direction

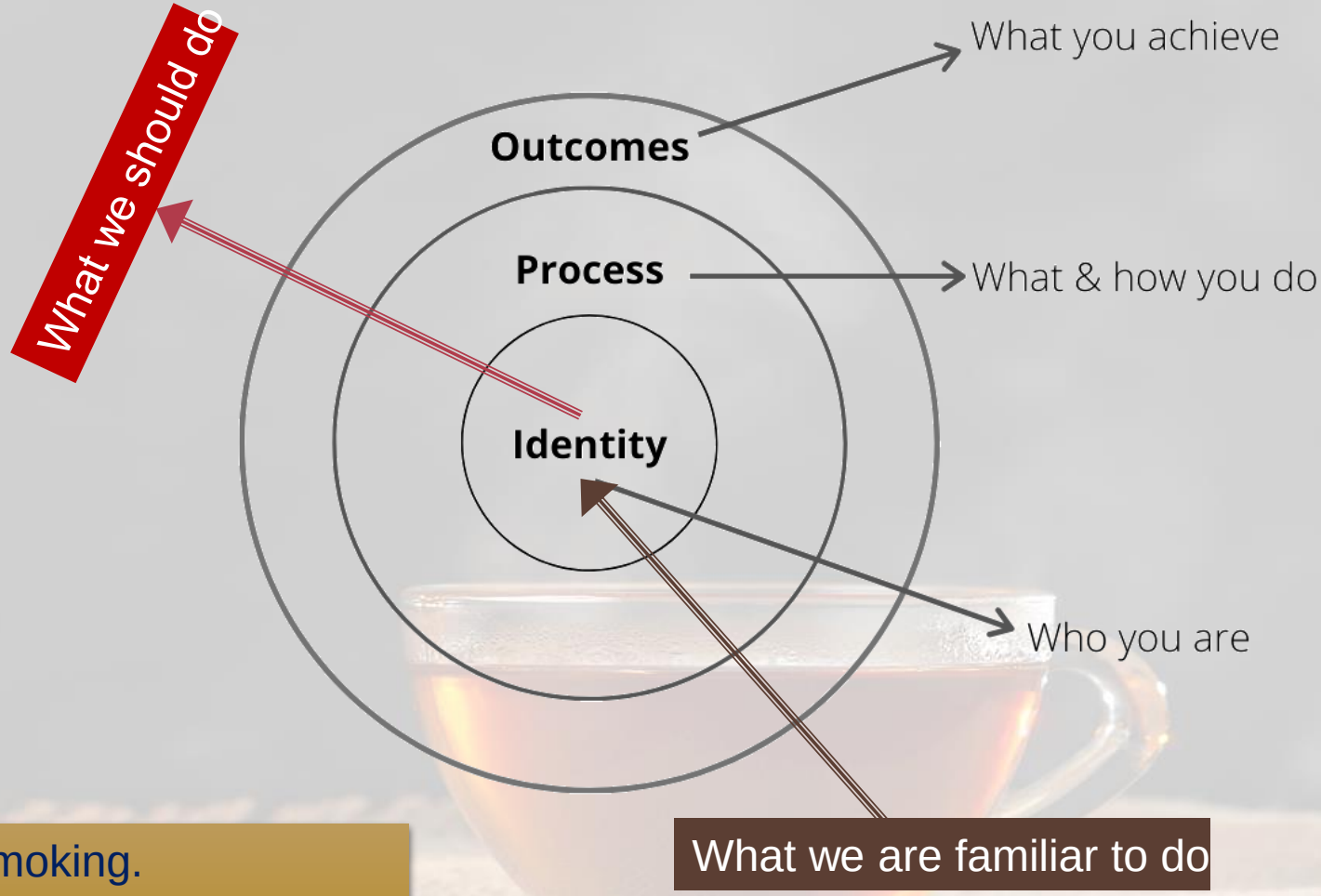


Determine right decision
- What problem are you solving?
- What is the definition of "right"?
- It could be all relative

To prevent bias
- Find source of bias
- Calibrate decision making process
- Collect proper data
- Utilize quantitative approach

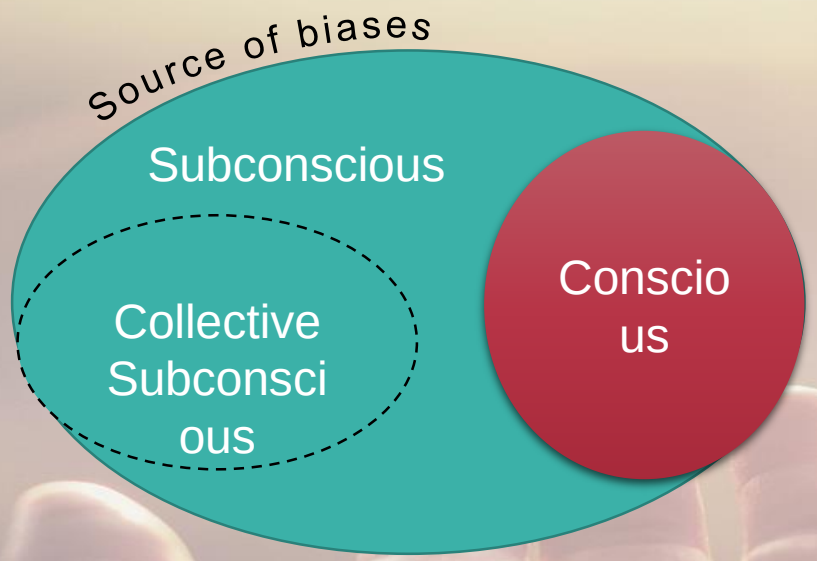
Tom lives in Cleveland suburbs with his wife and 10 years old son, Ashton. Tom works as a technician in a small manufacturing firm. His wife, Jessica, works part time as babysitter. Do they have a dog?

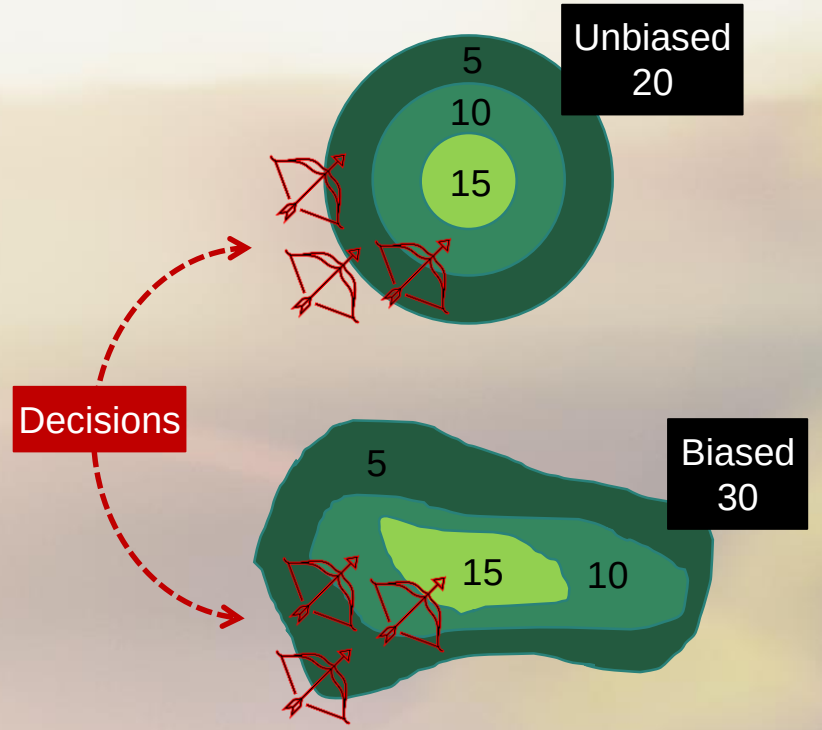




- To quit smoking, one needs to hate smoking.
- To run in a marathon, one should attempt to become a runner.
- To have positive view, you need to become a positive person.
- To adopt a new habit, one needs to change the believe system.

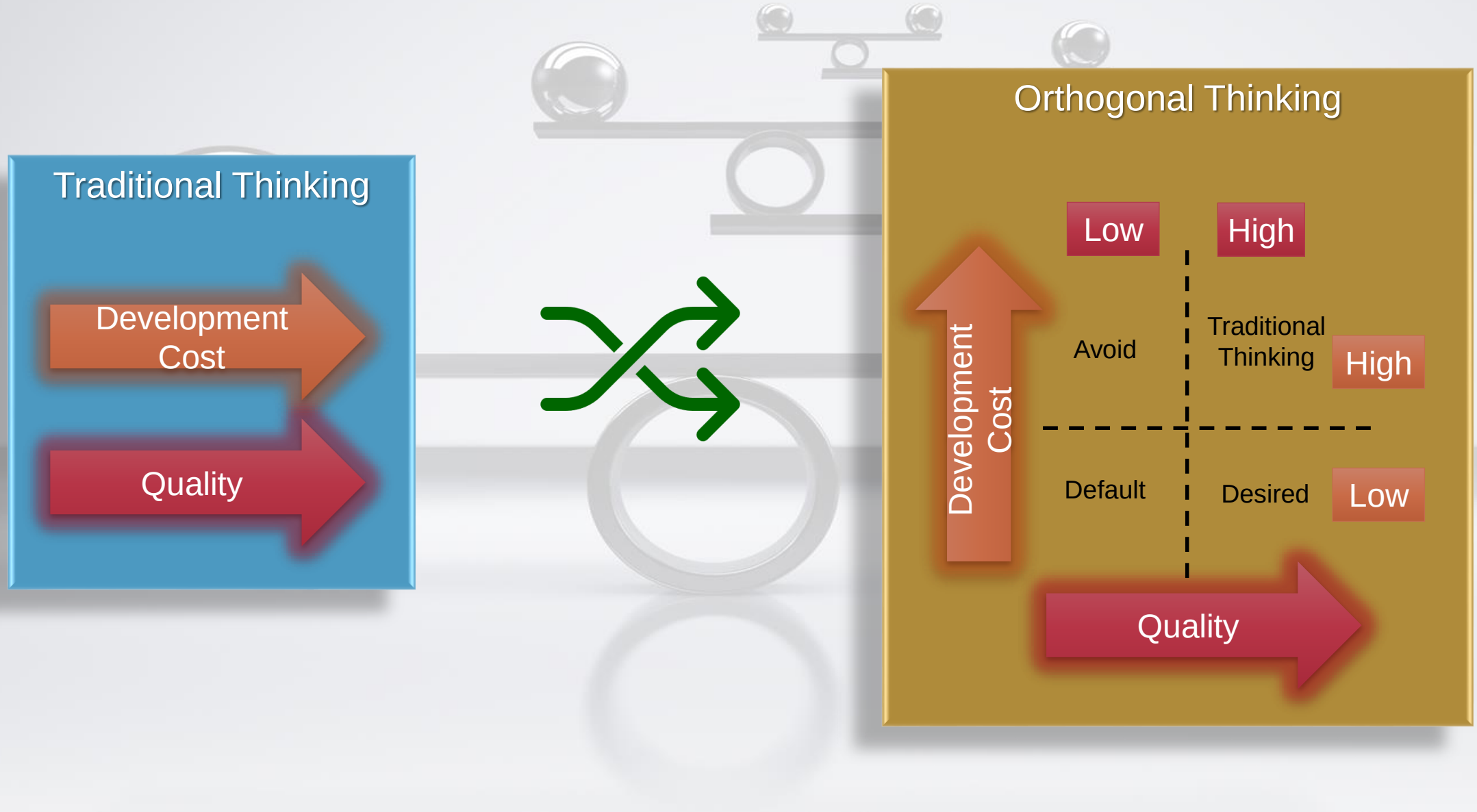
- Animals live under simple needs (food and reproduction)
- They made simple social orders to govern their simple needs
- These simple laws have been registered in their DNAs and passed

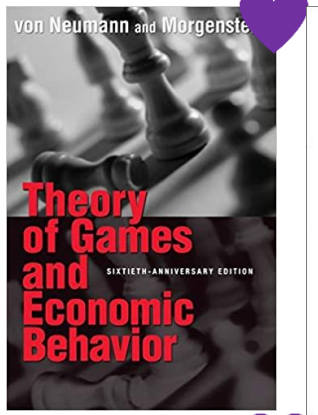




- Recognize desirable trends
- Ignore unwanted but real patterns
- Overestimate likelihood due to over confidence
- Inability to predict for long-term future

- Human's needs are more complex. To survive, we needed to be in a team environment
- Team of 150 people is the most optimized team. Society got bigger and needed more complex systems
- Our ancestors made languages to tell stories and gossips to social bond and host false believes
- Created social orders that are arbitrary (human laws, religion, freedom, equality, …)
- What you believe is only existing in your mind


Traditional Thinking
Development Cost
Quality
Orthogonal Thinking
Low
High
Development Cost
Avoid
Traditional Thinking
High
Default
Desired
Low
Quality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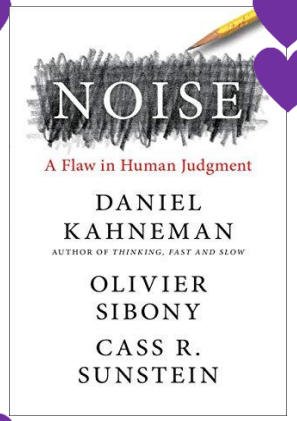
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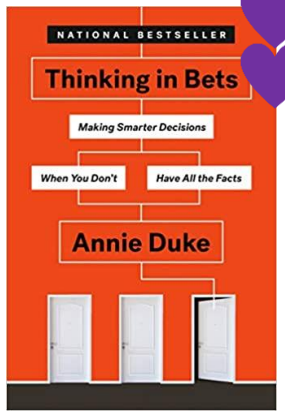
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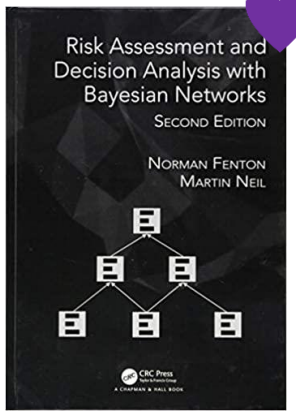
Have All the Facts
Annie Duke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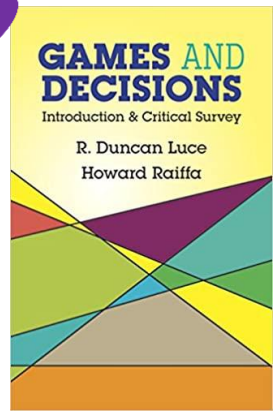
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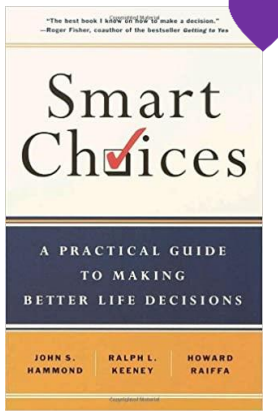
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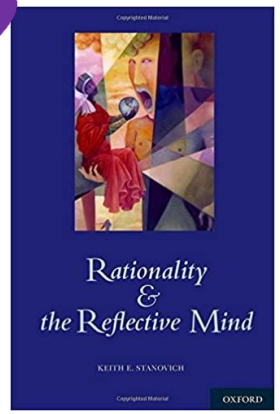
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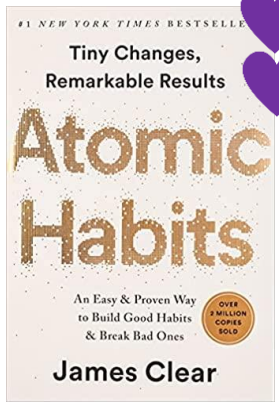
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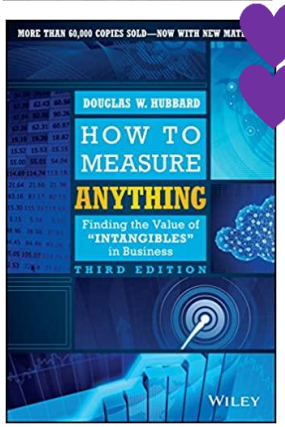
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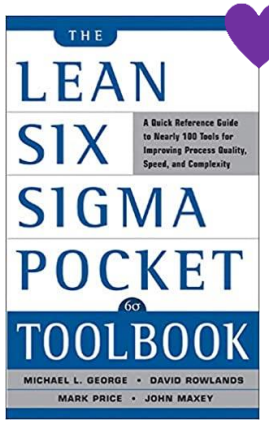
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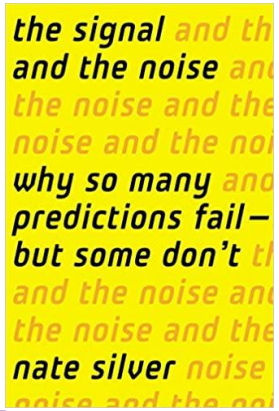
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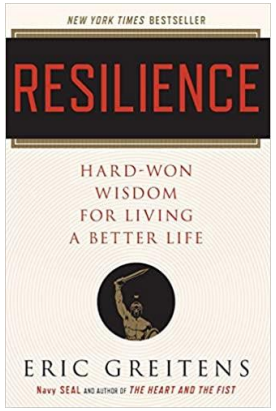
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ERIC GREITENS
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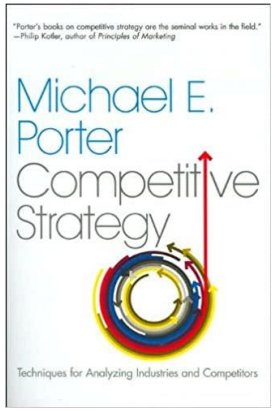
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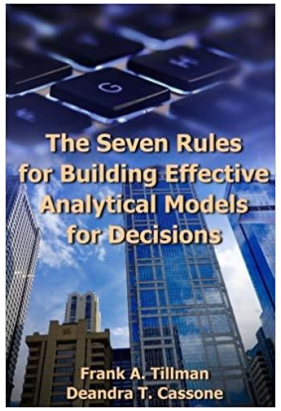
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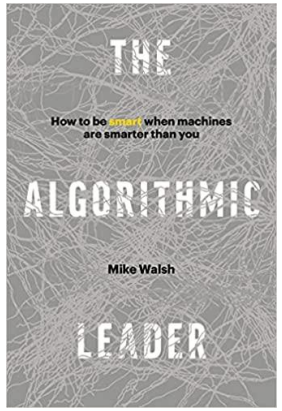
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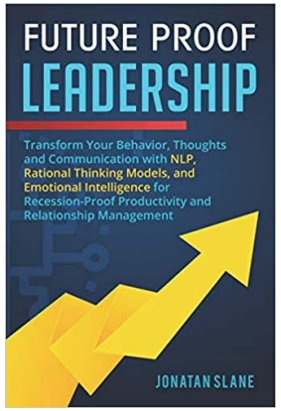
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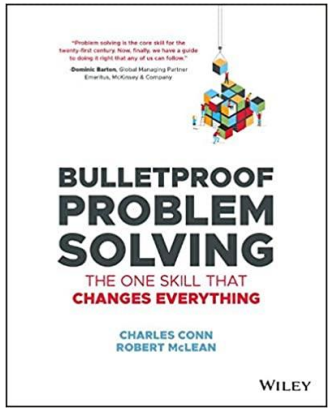
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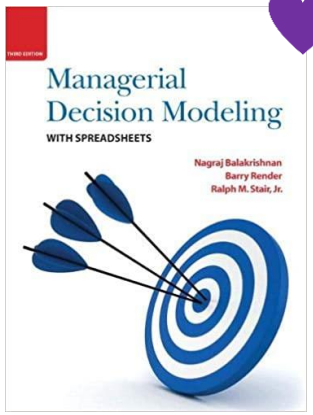
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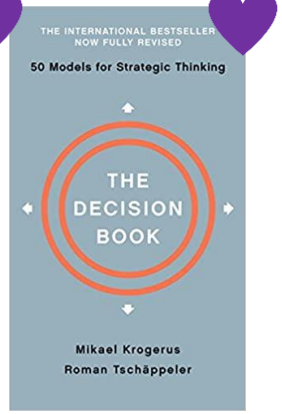
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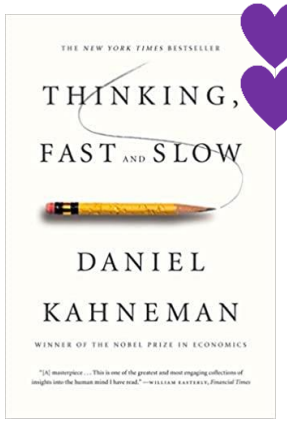
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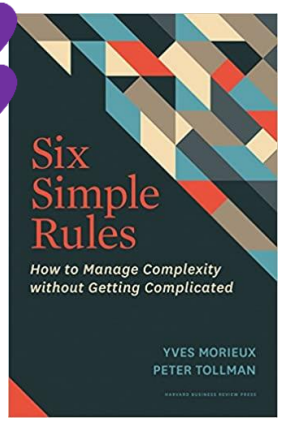
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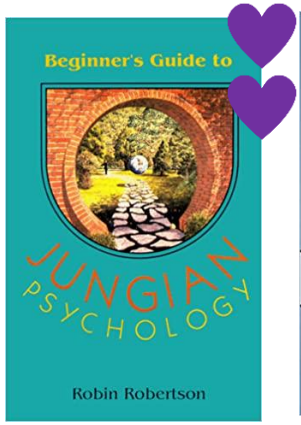
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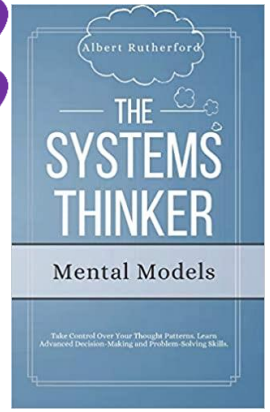
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