

An abstract graphic consisting of several red ink splatters and a curved line. There are three circular splatters of varying sizes and a thick, curved line that starts on the right and curves downwards and to the left. The text is centered over these elements.

Winemaking

Ashley French / Systems Thinking

The Winemaking Process / Glossary

GLOSSARY

Budburst: Bud burst refers to the period in early spring during which grapevines, which have been dormant through the winter, first begin to produce new shoots. During the bud burst phase, the vines are quite susceptible to frost damage. This makes it a particularly delicate time during the process of cultivating grapevines.

Canopy: The green foliage of a grapevine is called the canopy. The canopy can be trimmed or thinned to manage the amount of air and sun reaching the fruit, improving fruit quality, increasing yield and controlling disease.

Flowering: The emergence of tiny blossoms on grapevines in late spring. An important time of year, since spring rains and winds can disrupt flowering, reducing the potential crop.

Grafting: Uniting two plants so they grow as one. Most often used to join phylloxera-resistant rootstock with vitis vinifera buds that will bear fruit.

Pruning: The process of trimming the vine. Determining how many buds to leave on the vine, the grower decides the number of bunches and the maximum quantity of fruit each vine can bear in the coming year.

Rootstock: Disease-resistant native American grapevine grown specifically to provide a root system on which to graft Vitis vinifera varieties. Most of the world takes these measures to prevent attacks of phylloxera.

Suckering: Suckering is the removal of all unnecessary shoots which grow on vines as weather warms up. This process can take up to two passes through the vineyards. The benefits of suckering result in fewer grape clusters and higher concentrations of flavors. It also opens up the canopy for improved air circulation which can prevent mold and mildew.

Trellising: The process of tying up the annual green growth of vines on wires; a vine naturally wants to sprawl, but trellising organizes the new shoots, to expose more leaves and grape bunches to the sun and encourage air circulation to prevent rot.

Veraison: Occurs in late summer or early fall, when grapes start to lose their green color and take on mature hues, which can range from greenish yellow to red to almost black, depending on the variety.

Vinification: Loosely synonymous with "winemaking," the act of creating wine from grapes, beginning with the crushing of grapes at harvest and ending when the fermented juice is barreled.



The Winemaking Process / Intro

SYSTEM DESCRIPTION + OVERVIEW

Wine as we know it simply wouldn't exist without thoughtful human intervention. It all starts at the vine. The roots of grapevines grow exceptionally deep, and utilizing rootstock is a common practice. This is where the roots of existing vines remain in the ground and a separate plant is then grafted on top of those roots instead of planting an entirely new system.

In the 1860's an insect called phylloxera ravaged the wine regions of Europe. American wine roots were immune to the effects of this insect, and a solution involved replanting with American rootstock and grafting the European vines on top of these roots. American roots are now used for almost all wine production in Europe.

In addition to having good roots, proper pruning and tressil maintenance are crucial as this allows the plant not to waste its energy but to concentrate everything into the production of the grapes.

Once grapes are grown and harvested, all the work shifts from out in the field into the cellar. Here is when the greatest amount of human intervention takes place in varying degrees and where grapes are transformed from being just a fruit picked from a vine into an alcoholic beverage.

The drive for wine production today is fueled by the demand for the product by consumers. This has had an impact over time on the ways in which most wine is made, versus prior to the globalization of wine when most of it was made for the simple enjoyment of the maker and his close family, friends and community.

As demonstrated by the phylloxera example, there are many insects and diseases capable of destroying the crop which is why many farmers and winemakers jumped at the opportunity to use chemical sprays when they were introduced on the market, promising protection from these natural villains. However, time and science have shown us that

the effects of these chemicals on the vines and on the humans consuming the end product are less than great. Just as the adoption of pesticide use became a pattern, I believe that a retreat back to natural winemaking methods can become a pattern and influence the conventional industry to change their ways.

By looking deeper at the overall structure and behaviors of winemaking, we can further understand where to target our efforts. Fortunately there are a small percentage of growers who already are growing naturally for us to use as a model to strive towards and they've shown us what is possible in the world of winemaking.



The Winemaking Process / Rich Picture



The Winemaking Process / Process Overview



1. VINEYARD



2. HARVEST



3. CELLAR



4. CONSUMER

The Winemaking Process / Structure Type: Modules

SYSTEM BOUNDARY

The system boundary is the grapevine itself. Outside the boundary lies the specific environment and climate in which the plant lives, which includes factors like temperature, the use or non-use of harmful chemicals like pesticides, soil vitality, amount of sunshine and rainfall received, age of the roots/vines and grape varietal.

SYSTEM ELEMENTS

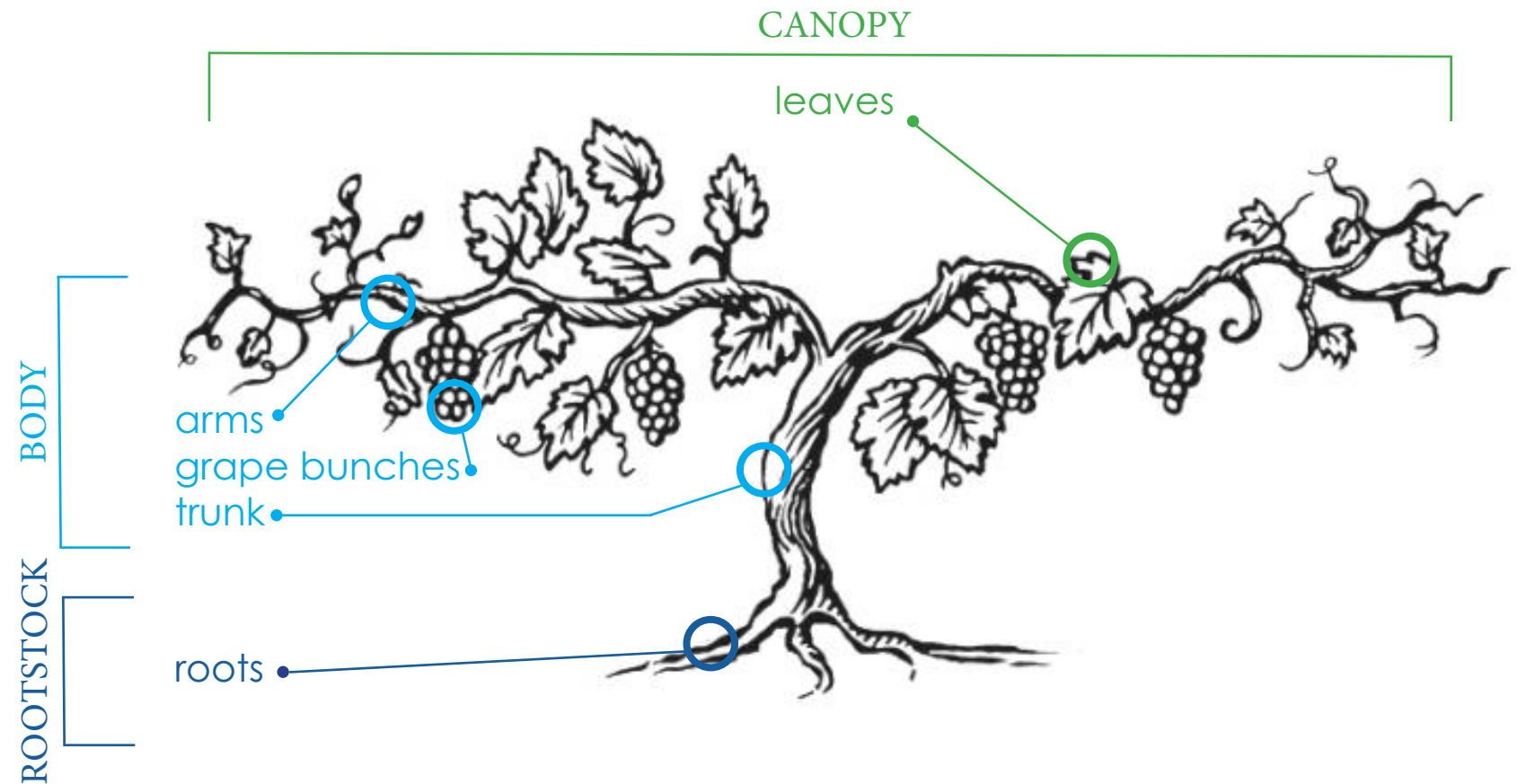
Each individual part of the plant is an essential element to the system of the grapevine: leaves, grape bunches, arms, trunk and roots.

RELATIONS BETWEEN ELEMENTS

Each of the modules function as sub-systems to the greater whole. The canopy of the plant plays an extremely important role in the protection of the plant from sunlight and insects. The body is where the fruits of the labor of the plant can be easily seen. The roots go unseen but are responsible for the proper absorption of nutrients and water from the soil which are critical to the health and success of the plant.

CONNECTION TO ENVIRONMENT

Like all green plants, grapevines use sunlight in order to convert CO₂ and water into food, releasing oxygen as a byproduct back into the environment. The plant also absorbs water from the soil which contains broken down minerals. As a result of these processes, the plant is capable of producing fruit.



The Winemaking Process / Structure Type: Ring

SYSTEM BOUNDARY

The system boundary is the winemaking process. Things outside the boundary would include other means of making alcoholic beverages, and other uses for grapes besides wine.

SYSTEM ELEMENTS

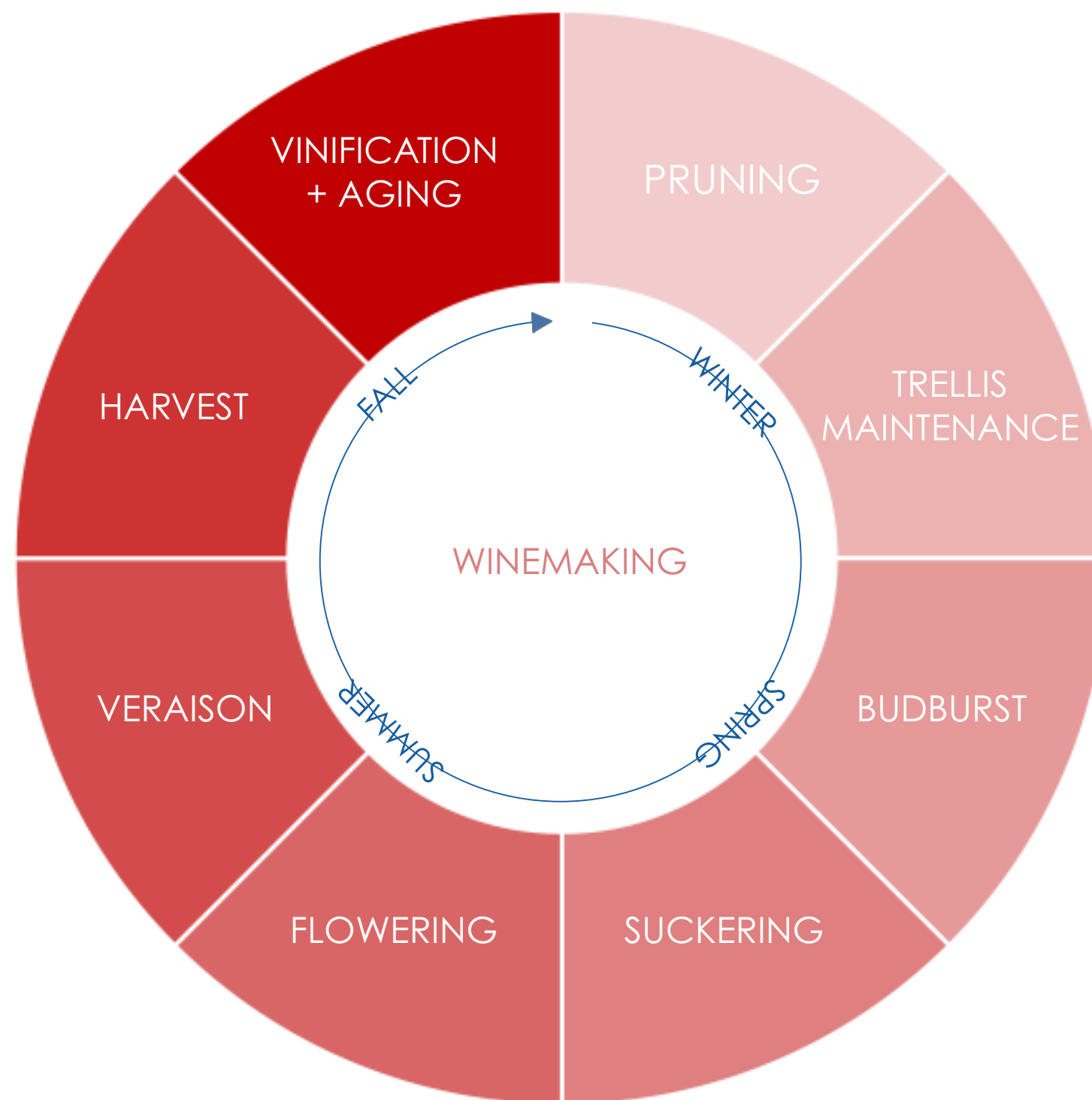
Each element of this system is a different step in the process of making wine, and it happens on a yearly cycle as temperature/season play a large role in the timing of the different processes.

RELATIONS BETWEEN ELEMENTS

Each process depends on the success of the previous process, and all processes must happen in sequential order.

CONNECTION TO ENVIRONMENT

Terroir is the particular flavor and taste given to a wine by the environment in which it's produced. Wine has the power to give this to its consumer, allowing someone to experience a place and time they weren't physically present in.



The Winemaking Process / Structure Type: Hierarchy

SYSTEM BOUNDARY

The system boundary is the wine industry, casting a much wider net than the previous two explorations of the winemaking system. Outside the boundary lies the beverage industry.

SYSTEM ELEMENTS

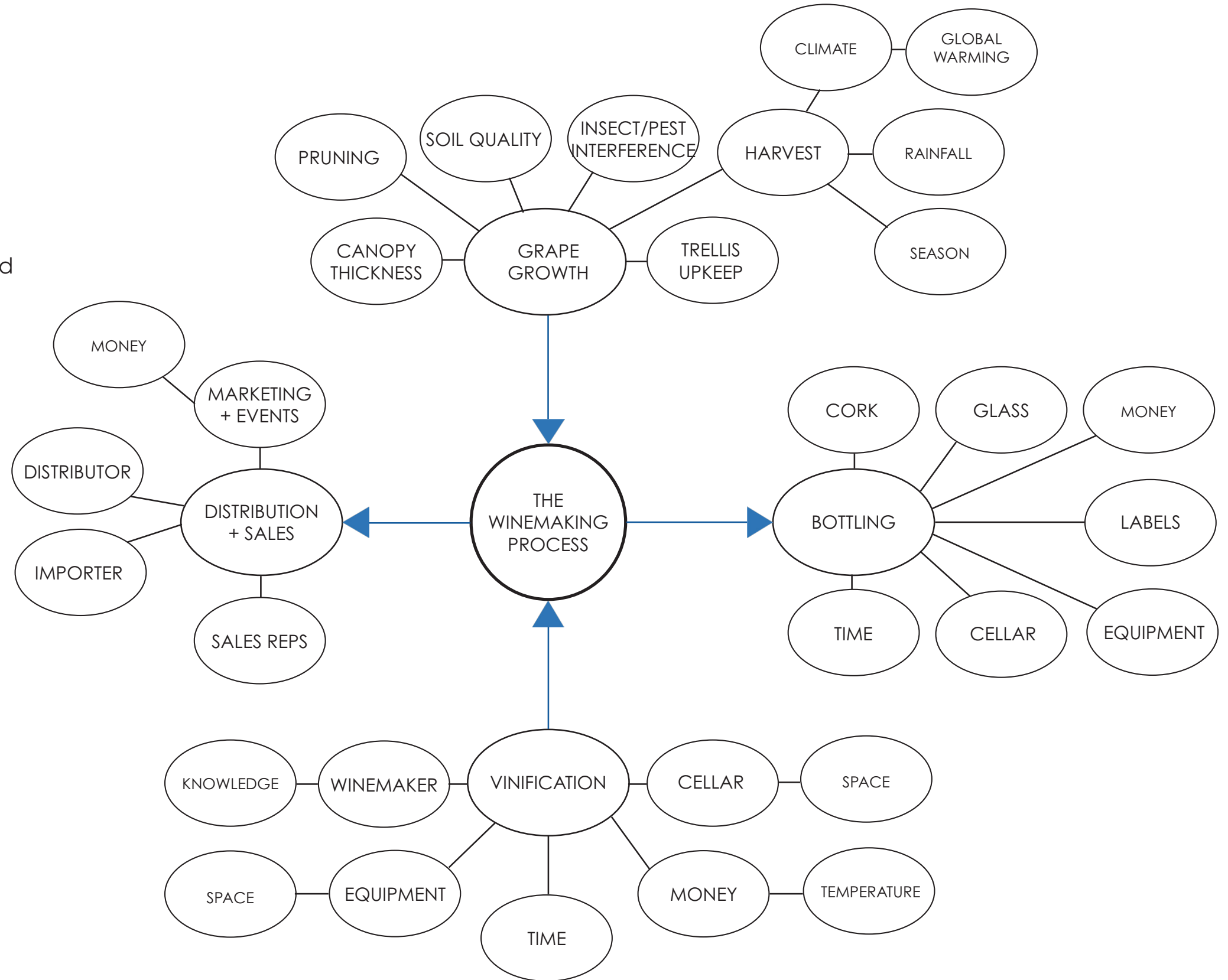
Three of the main system elements, grape growth, vinification, and bottling, occur on vineyards and within the controlled environment of a winery. The fourth system, distribution and sales, is what opens everything up to the world and is what allows the product to be sold and shared to a larger group of people.

RELATIONS BETWEEN ELEMENTS

The most important and vital elements to successful winemaking are those which are closest to the center, and everything else branches out from there.

CONNECTION TO ENVIRONMENT

The winemaking process is the only way in which to turn grapes into wine. Once the finished product has been made, wine is then available for mass consumption. This has large-scale effects for restaurants, stores, and individuals who can then sell, purchase, and consume the product as well as decide things like how to dispose of the bottle and packaging in which it comes.



The Winemaking Process / System Exploration

Why explore this system?

Modern developments of pesticides and machinery have altered the way wine is made. The increase in global demand for wine, and therefore the consumption of wine, has also largely effected wine production and wine's place in the alcoholic beverage industry.

BROADER SYSTEM:
The Alcoholic Beverage Industry

ORIGINAL SYSTEM:
Winemaking

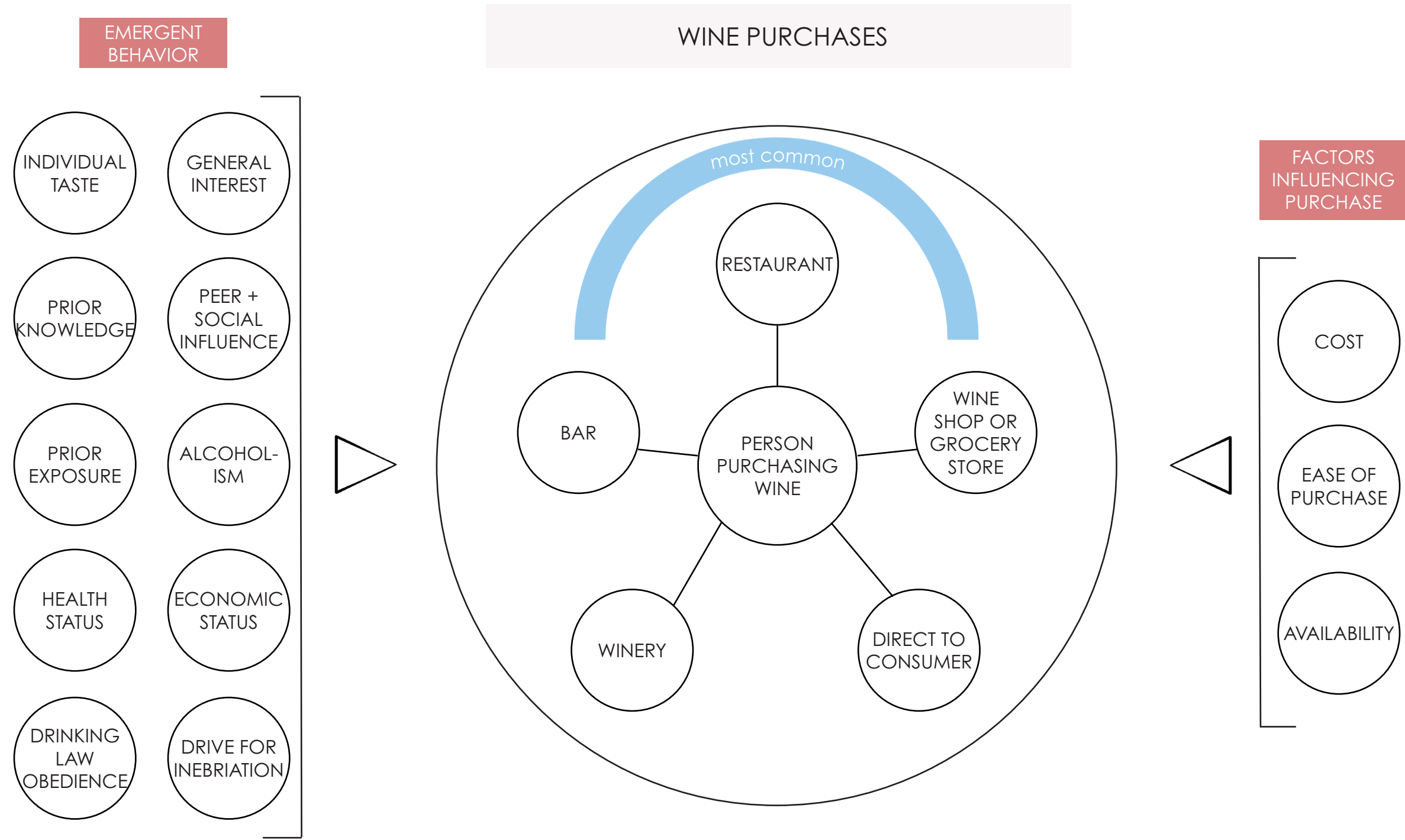
NARROWER SYSTEM:
Natural Winemaking

EVEN NARROWER
SYSTEM:
Natural Winemaking
with
Biodynamically
Grown
Grapes

What do I need to further explore?

To be further explored are the specific ways in which pesticides and substances added during the winemaking process play a role in the finished product. Also to explore are ways to get conventional producers to transition to a more natural winemaking process.

The Winemaking Process / Complex Adaptive System



The Winemaking Process / Complex Adaptive System Details

This system's boundary is the wine industry. The agents are the people purchasing wine.

EMERGENT BEHAVIORS

These behaviors are unpredictable and have a high level of variance from person to person. If every person were given a score for each of the different emergent behaviors, almost nobody's score would look the same because we as humans are influenced by so many different factors.

EXAMPLES

Alcoholism: A person who has a history of alcoholism or for whom this disease runs in their family will exhibit different buying habits than someone without this influence. It's not only impossible to predict who these people will be, but it will also be a challenge to predict their buying habits because there's no way to predict when or how frequently someone will be in a period of heavy drinking versus a period of being sober.

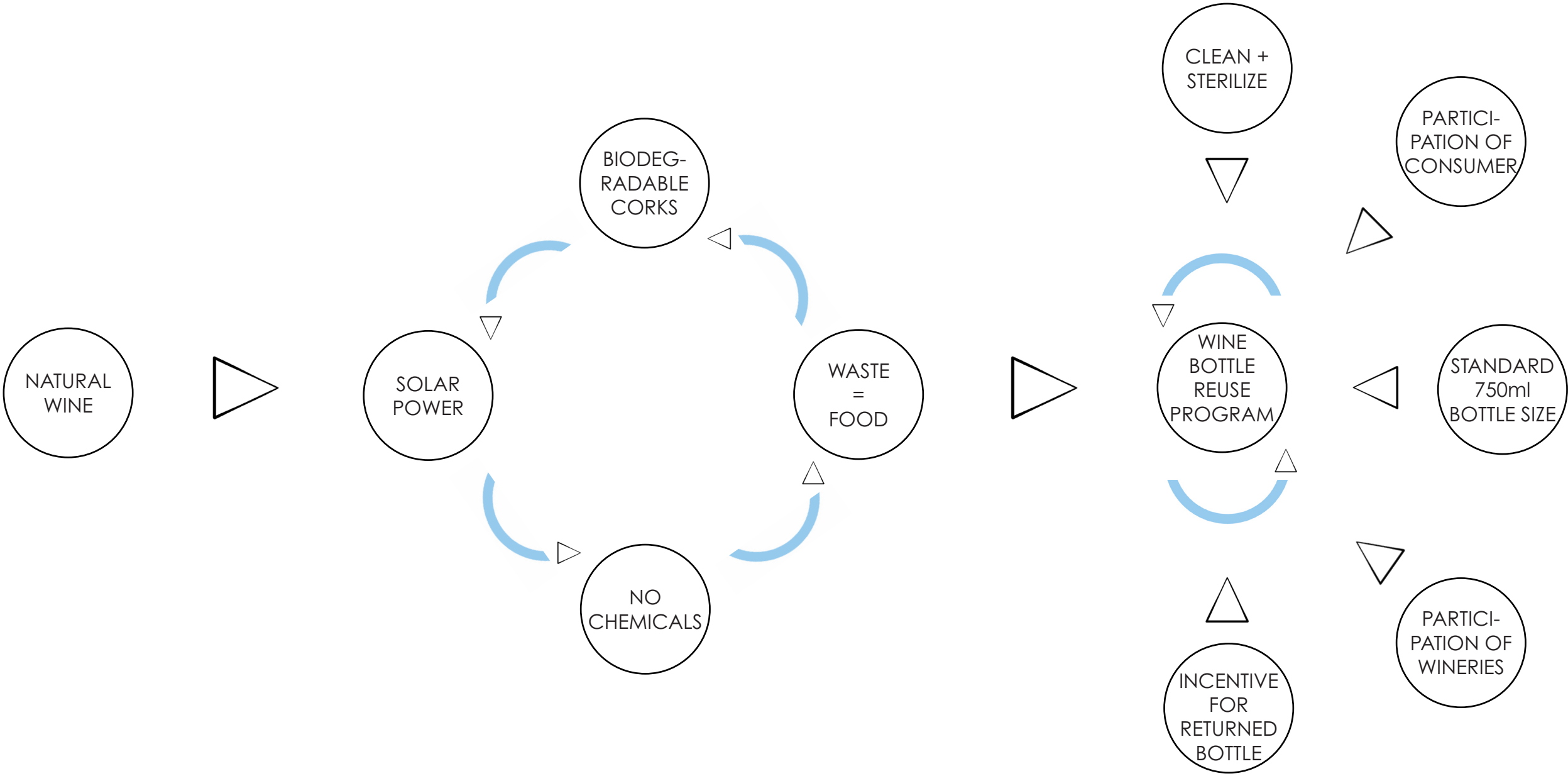
Drinking Laws: I've used laws as an example of emergent behavior because laws on drinking ages are so prevalently broken. For example, even though the drinking age in the US is 21, a large percentage of teenagers start drinking before they're of age. How early they start drinking and with what frequency are very unpredictable and depend on a wide range of factors, such as if they have a fake I.D. and parents' leniency.

Health Status: Another large unknown is an individual's health. It's impossible to know of the health conditions of individuals which requires them to limit or abstain from alcohol consumption. Of course, there are also plenty of people without health conditions who simply choose not to drink for other reasons, as well as pregnant women who are advised not to drink for a period of time etc.

Economic Status: How much money someone makes plays a big part in their buying habits, but it varies an extreme amount from person to person. For example, someone who is wealthy and is saving up to buy a girlfriend an engagement ring might decide to cut back on purchasing certain things in order to save for the ring, all while hoping to maintain their same level of existing savings. Doing so, they may decide not to eat out as much (therefore not purchasing as much wine at restaurants) etc. Economic status alone is overall a faulty indicator of who will make wine purchases.

The Winemaking Process / System Solution 1: Closed Loop

WINEMAKING - CLOSED LOOP SYSTEM



The Winemaking Process / System Solution 1: Closed Loop

THE GOAL

Create a closed loop wine production system that creates zero waste and gives nutrients back to the earth.

HOW?

Technical Nutrients

1. RECYCLED GLASS

Because there's a standard wine bottle size, instead of being broken down for downcycling after one use, wine bottles are simply kept in their original state and sent back into the system to be re-used. This prevents a waste of energy to break down old bottles and prevents downcycling. This would simply be a matter of determining the logistics of taking used bottles, removing the labels, cleaning them, and returning them to use.

Biological Nutrients

2. BIODEGRADABLE CORK MATERIAL

Natural cork is the best product for use in wine bottles, compared to any other material, due to their unique ability to let the right amount of air in and out of the bottle. However, it's a natural resource that's being depleted. Mylo (TM) biotextile is a material grown from mushrooms that can be grown to look and act just like natural cork but is completely biodegradable and can be thrown directly into a compost. This is a way to take nutrients used and return them to the earth. This would require convincing winemakers of the validity of the new substance and proving its quality.

3. WASTE = FOOD

All by-products created during the winemaking process (wine skins, stems etc.) are ground up and either placed back onto the ground of the vineyard to nourish the soil, or are placed in a compost. This will generate nutrients that can in turn be returned directly to the soil of the vineyards and strengthen the environment's biodiversity. This would require educating winemakers about the specific methods to use and why it's worth their time to do it.

4. NO CHEMICALS

Organic + biodynamic farming methods are combined with natural wine practices in the cellar - no chemicals used. This prevents the depletion of the soil's existing nutrients, encourages the growth of healthy plants, and keeps chemicals from entering our wine or our water systems. This will be the most challenging to convince conventional winemakers of because using chemicals is simply the easier route and allows for wine that is perfectly uniform in taste from year to year.

Free Power

5. SOLAR POWER

Solar panels are installed on the roof of the winery to supply energy to the entire building. This provides free energy for the needs of the building as well as the needs of the winery equipment. The goal is to generate enough solar power that no fossil fuels would need to be burned in order to generate energy. This will require convincing winery owners to make the upfront investment required to purchase solar panels.

The Winemaking Process / System Solution 1: Closed Loop

WINE BOTTLE REUSE PROGRAM

Enacting a program to reuse glass wine bottles would not only be using recycled material, as glass bottles could be originally generated from recycled glass, but they could be used an average of 15 or more times before being placed back into the recycling bin. Similar programs already exist for beer bottles. For example in Latin America, refillable bottles make up more than 60 percent of the market. There are a number of factors that would play into a successful bottle reuse program for wine bottles.

How will it work?

Clean + Sterilize: All bottles will need to be cleaned and sterilized after use to ensure they can safely be reused.

Participation of Consumer: The success of the program will rely on the participation of the consumers to return bottles to be reused. Providing an incentive for the return of bottles will play largely into this (further detailed below). However, I also believe that starting this program amongst natural wine consumers will play in favor of the program because natural wine drinkers are in general more likely to be conscious consumers and willing to forego a bit of personal inconvenience to do something for the greater good.

Standard 750ml Bottle: All wineries that participate in the program would need to use the same type of bottle, which is conveniently already the case for most wine bottles on the market today.

Participation of Wineries: Just as consumer participation is integral the success of the program, onboarding wineries and getting them to take part is equally as important. Below I've outlined a number of benefits of the program which would be an incentive for wineries to participate.

Incentive for Returned Bottle: A small incentive to the customer to reward a returned bottle would do wonders for the success of the program. For example, they could receive a dollar back for every bottle returned, or wineries could give them credits towards future wine purchases.

Why participate?

There are a number of benefits this program would have in addition to producing less waste. Specifically, we see a number of reasons why businesses should look to make a program like this a priority.

Increase in Customer Loyalty: Customers who see that an effort is being made by the company to do something better for the environment and take an active role in bettering their operations would lead to an increase in customer loyalty, and therefore an increase in sales.

Increase ROI: While purchasing bottles that are worthy of reuse requires a bit more money up front, the return on investment is significantly increased over time once the bottles are reused.

Increased Sustainability: Producing glass bottles requires materials and energy, both of which would be significantly reduced when a bottle is able to be reused numerous times.

The Winemaking Process / System Solution 2: Archetypes

INCREASE PRESENCE OF NATURAL WINE IN RETAIL

Finding a way to get more retailers to carry a larger selection of natural wines, or to begin carrying it in the first place, would lead to more people trying and learning about natural wine and therefore increased sales. There are a number of ways in which this could be made a possibility:

Distributors + Importers: Incentivise the distributors and importers to bring in more wine and push the sales of natural wine into retail locations. They truly hold the power as to deciding what wines are brought into the country and sold at what retail locations. New York is where the majority of importing and distribution occurs. Aside from the benefits of its location, New York is also responsible for a large portion of wine sales in the US. If there's an increase in demand for natural wine elsewhere in the country, this will encourage distributors to distribute to more states and new cities.

Wine Shops + Restaurants: Providing wine shops with information on natural wines and the authentic stories of their growers to share with customers would give them a greater incentive to carry natural wines in their shop. This is truly what sets natural wine apart from conventional more than anything else - the growers relationship to their land and the true terroir you are able to feel and taste when drinking their wines.

For restaurants, distributors could provide food pairing options specific to natural wines to encourage chefs to include those ingredients on their menu with accompanying wine pairing options. Restaurants would also be a perfect place for staff to share the stories of the natural wineries and makers to capture the attention and hearts of the consumers.

The Winemaking Process / System Solution 3: Archetypes

ADVOCATE FOR HEALTH BENEFITS OF NATURAL WINE

This is a unique way to appeal to the consumer and influence their decision to purchase natural wine over conventional. The best part is that there is no false truth in the health statements being made - natural wine is truly better because chemicals aren't being added to the wine. This is an especially strong selling point for Millennials as they continue to get older, make more money, and have more buying power. Millennials in general are more conscious consumers and care more about both their bodies and the environment. Studies also show that alcohol consumption shifts from spirits to wine and higher quality beer as a person ages.

I think that social media is the strongest component of this proposed solution, as it allows for a fast spread of information and the ability to reach such a broad audience. It also allows for endless possibilities as far as outlets - news outlets, bloggers, influencers, health sites etc., in addition to more obvious wine specific outlets, could all be used to share this information to their unique niches of followers.



THANK YOU

Sources

1. Wine Stain Image

Dreamstime.

<https://nl.dreamstime.com/stock-illustratie-de-vectoringen-van-de-wijnvlek-plaatsen-image60839728>

2. Grapevine Image

Stephen Noble.

<https://www.stevennoble.com/v/Animals-Nature/Grapevine+Tree+.jpg.html>

3. Glossary Definitions

Wine Frog

<https://www.winefrog.com/>

Wine Spectator

<https://www.winespectator.com/>

4. Statistic on alcoholic beverage industry revenue

<https://www.prnewswire.com/news-releases/alcoholic-beverages-market-expected-to-reach-1594-billion-globally-by-2022---allied-market-research-618354513.html>

5. Wine Images

<https://www.tedsgardens.com/class/grapevines-wines/>

<https://www.winespectator.com/webfeature/show/id/52359>

<http://oukas.info/?u=Quality%2BWine%2BBarrels>

<https://www.dailystar.co.uk/news/latest-news/679134/drinking-wine-health-benefit-flush-toxins-disease-dementia-study>

<https://traynorvineyard.com/blogs/news/small-production-exclusive-wines-natural-winemaking-methods-it-s-kind-of-our-style-to-push-the-limits>

<https://vinepair.com/wine-geekly/what-is-natural-wine-and-should-you-care/>

6. All Model Images

NetLogo.

<https://ccl.northwestern.edu/netlogo/>

7. Bottle Recycling Info

Craft Brewing Business.

<https://www.craftbrewingbusiness.com/featured/the-refillable-glass-beer-bottle-makes-a-comeback-with-the-oregon-beverage-recycling-cooperative/>