myWineBar

Presented by: David Gould

Systems science concepts applied to a small business such as a wine bar.

System

Written Definition

- A bounded set of elements and their relations that exhibit behavior.
  - Elements may be agents, components, or subsystems.
  - Relations are a set of ordered pairs that define the interconnections, interactions, or dependencies among the elements. Examples:
    - S = {Bob, Alice}, with a relation R on S, {(Bob, Alice) | Bob and Alice are married to each other.}
    - S = {N} with $x > y$, R = {(x, y) | $x > y$}
  - Behavior of elements is expressed in terms of algorithms or rules that (a) transform external inputs to internal throughputs to external outputs or (b) that modify internal operations; that is the system itself changes or adapts.
  - The arrangement or pattern of elements and their relations make up the structure of the system.

System

Adapted from Mobus (2015)

Set-Theoretic Definition

- A system is an 8-tuple
  - $S=\{E_{in}, R_{in}, E_{out}, R_{out}, B, T, H, P\}$
- Where
  - E_{in} is the set of elements of interest inside the system S
  - R_{in} is the set of relationships of interest among the elements $E_{in:}$ agents, components, or subsystems.
  - E_{out} is the set of elements of interest outside the system S
  - R_{out} is the set of relationships of interest among the elements E_{out} : Other systems, agents, components, or subsystems with links to the system S
  - B is the set of the boundaries of the system
  - T is the set of algorithms transforming inputs to throughputs to outputs
  - H is the history of the system
  - P is the set of the states of the system at various times

System

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- The arrangement or pattern of elements and their relations make up the structure of the system.

myWineBar

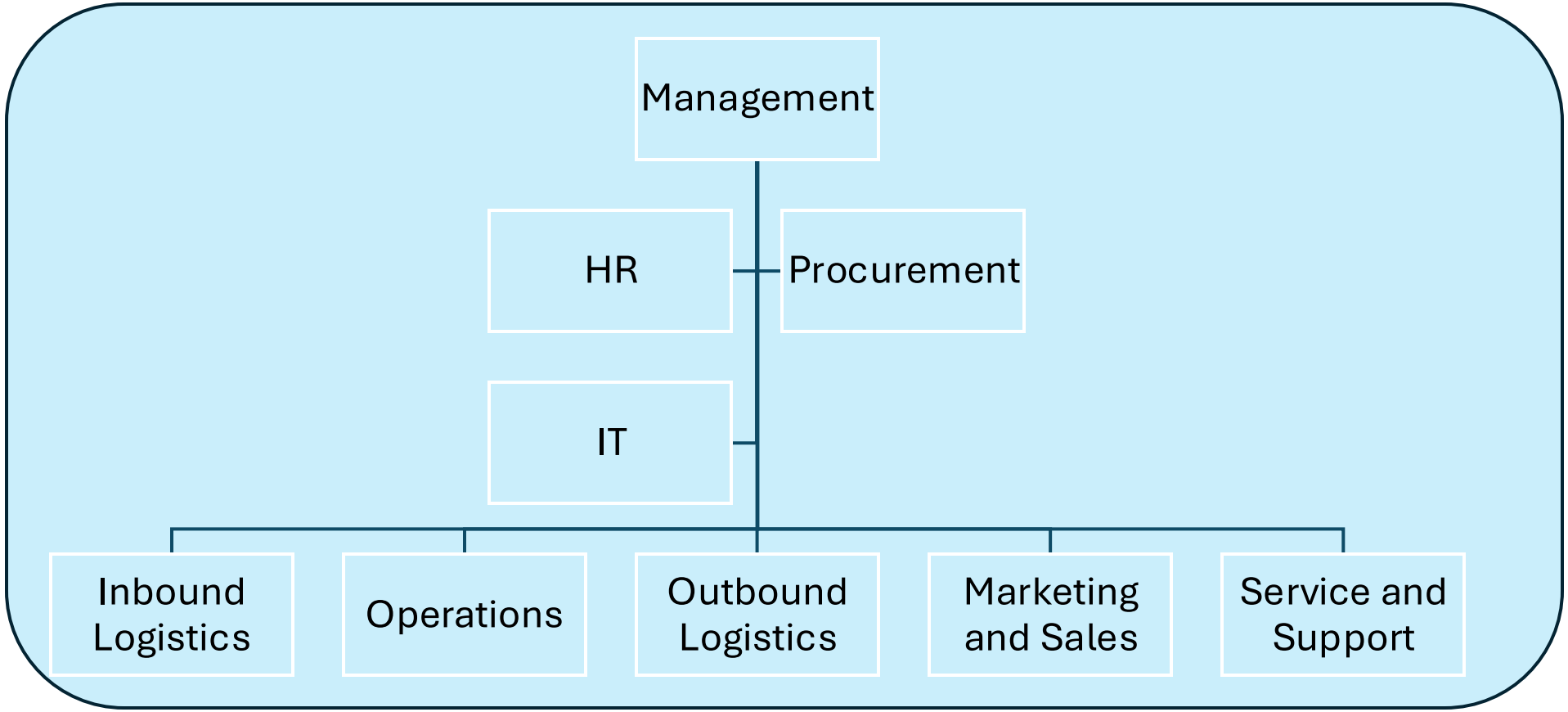
System

myWineBar

- myWineBar is a system with several elements
  - Subsystems include the beverage and food service systems
  - Its boundary (a component) is the perimeter of the building.
  - Other components include stocks of food, wine, and electronic devices such as payment systems and sensors among others.
  - Agents include the staff and owners / investors
  - The structure is a simple tree structure with the wine bar system at the top and the two subordinate subsystems
  - Interfaces include doors and windows
  - Algorithms for managing the system, HR, procurement, inbound logistics, operations, outbound logistics, sales and service and such describe behaviors. (adapted from Porter)

System

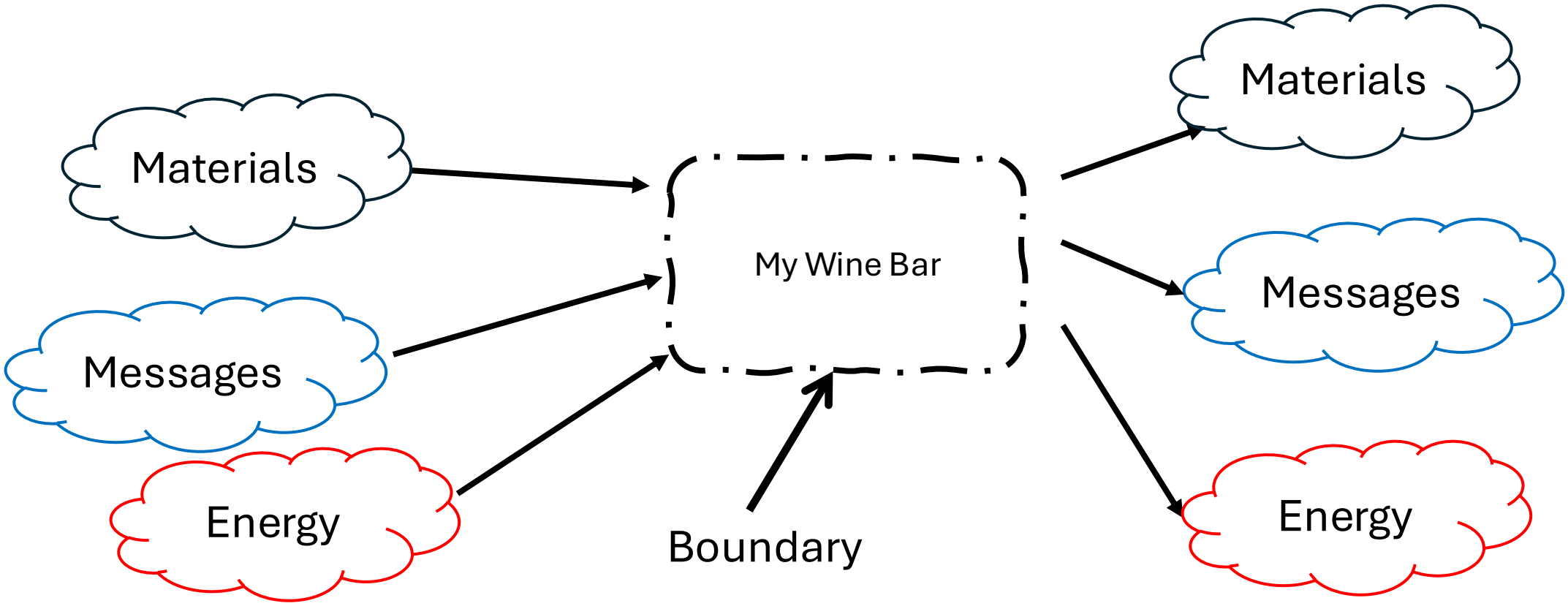
myWineBar



Subsystems are Management, HR, IT, ...

Adapted from Michael Porter

myWineBar
Context Diagram



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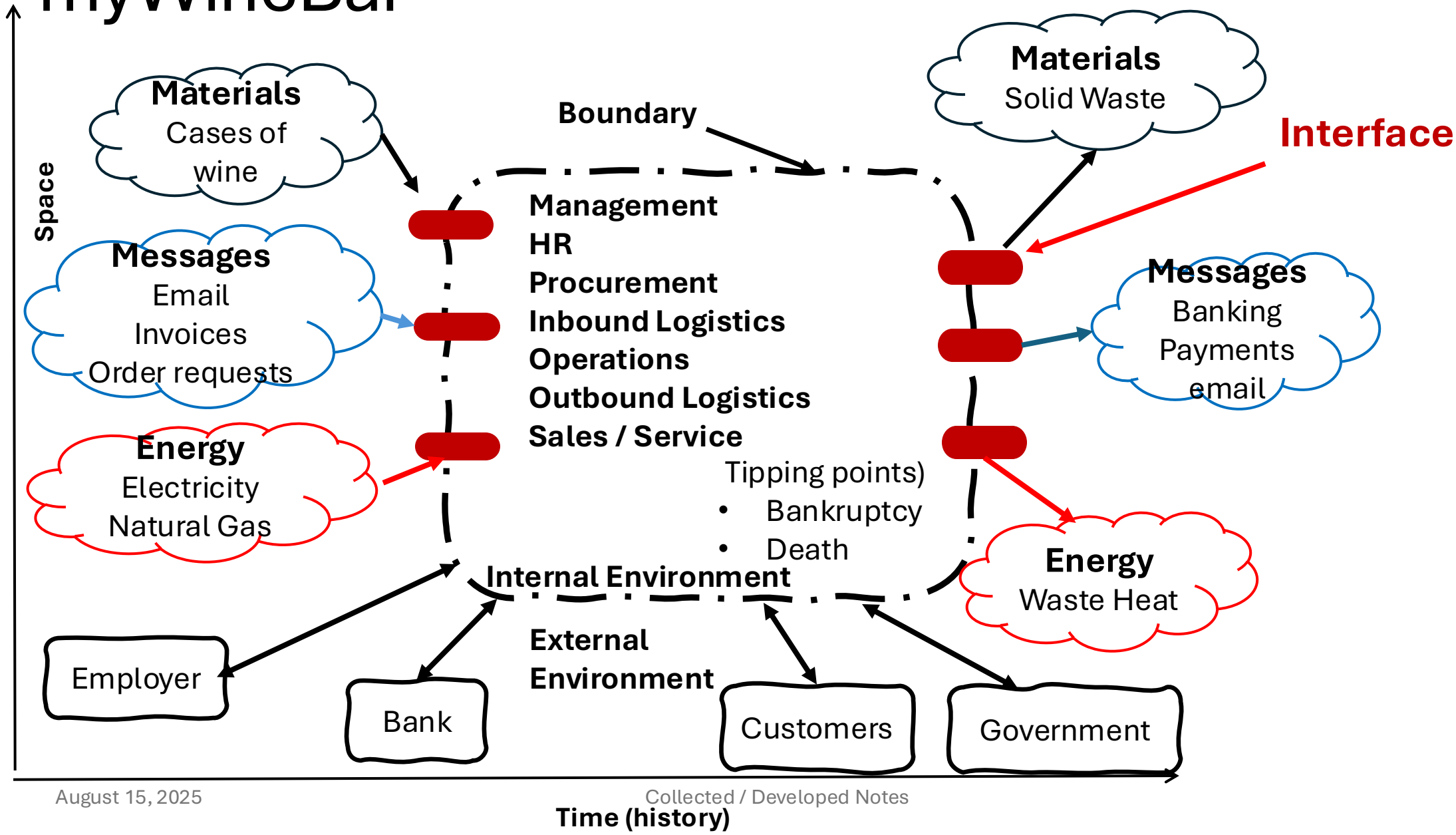
Space
Materials
Cases of wine
Messages
Email
Invoices
Order requests
Energy
Electricity
Natural Gas
Boundary
Management
HR
Procurement
Inbound Logistics
Operations
Outbound Logistics
Sales / Service
Tipping points)
• Bankruptcy
• Death
Internal Environment
External Environment
Employer
Bank
Customers
Government
Materials
Solid Waste
Interface
Messages
Banking
Payments
email
Energy
Waste Heat
Time (history)

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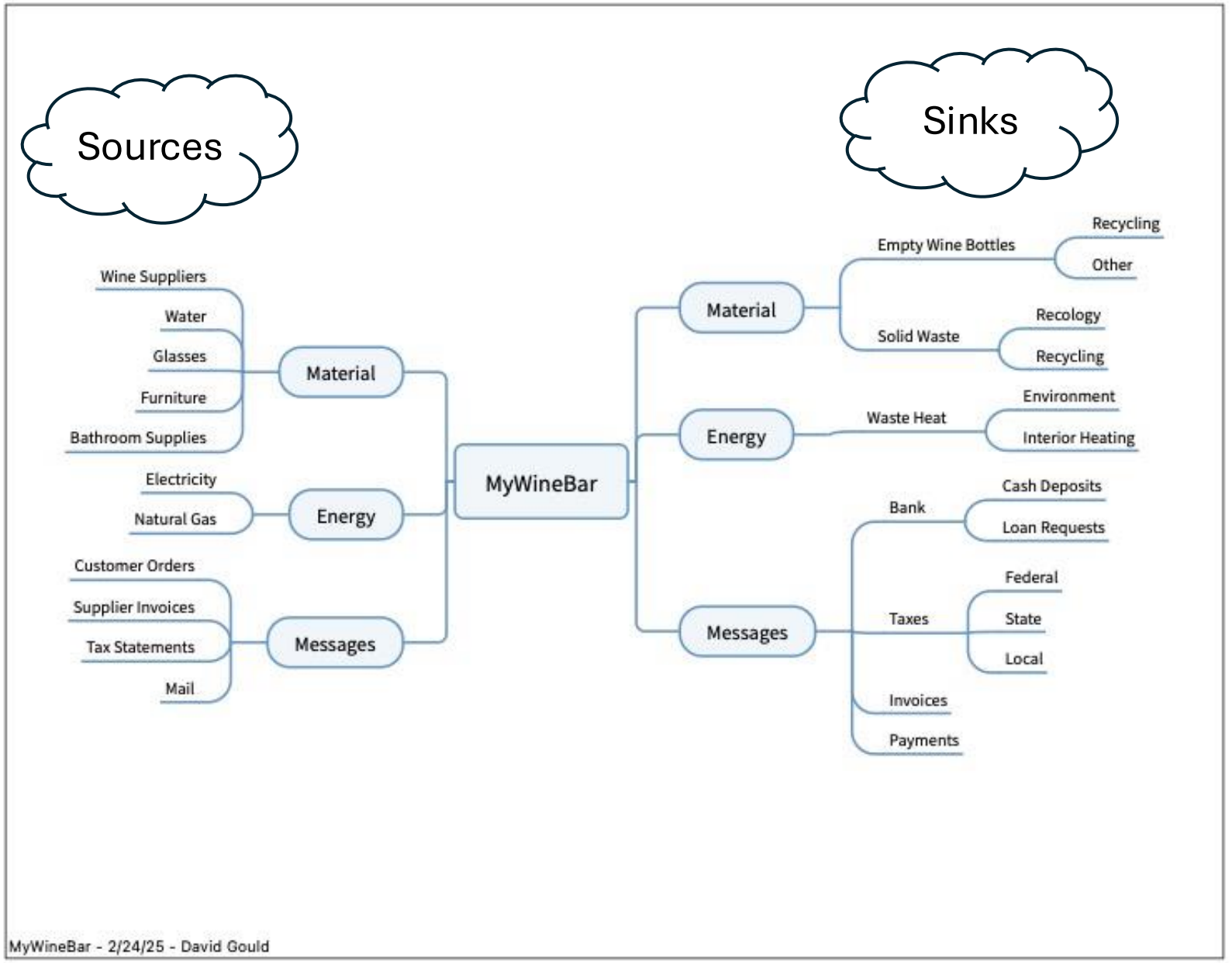
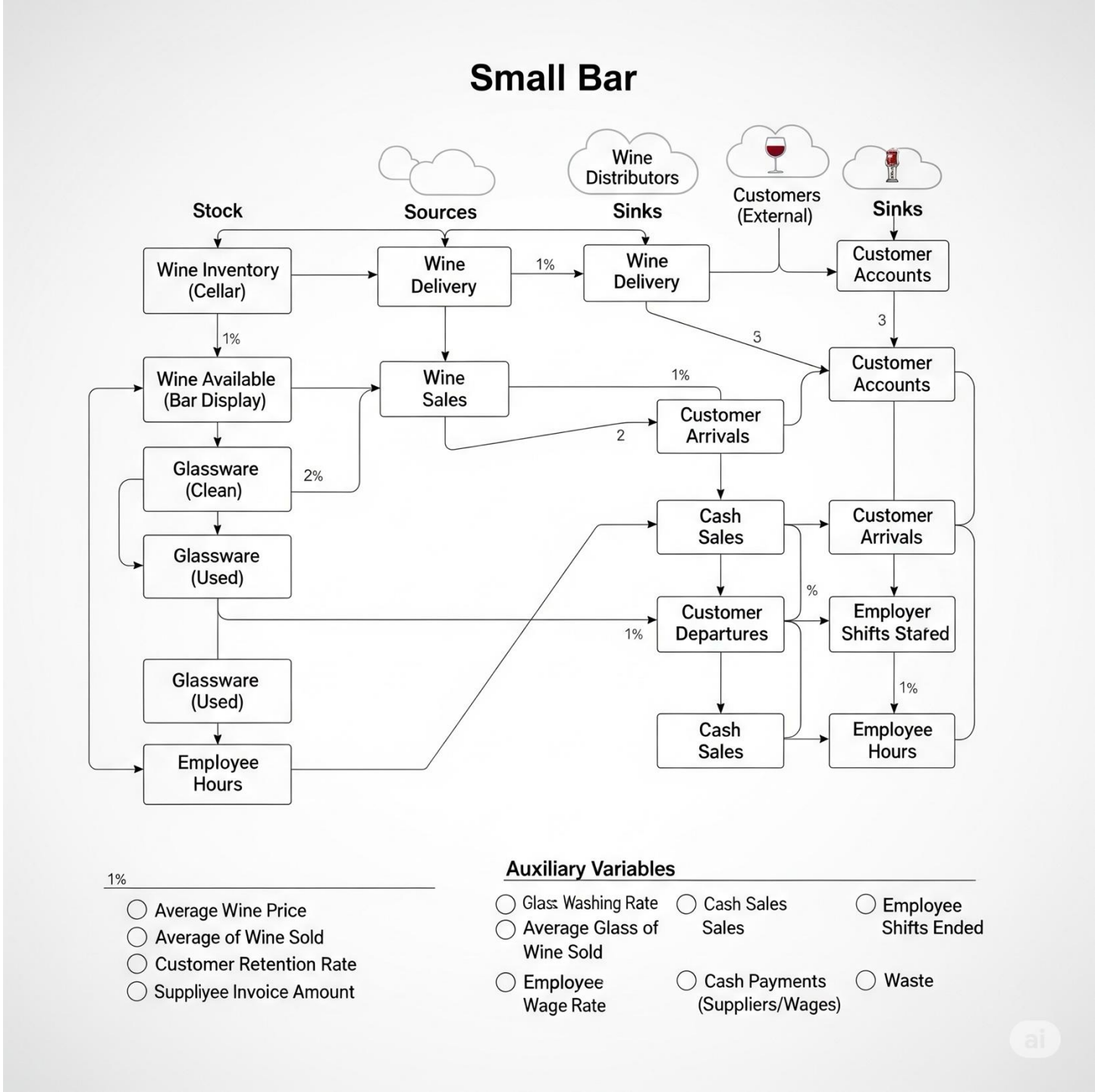
Expanded
context diagram

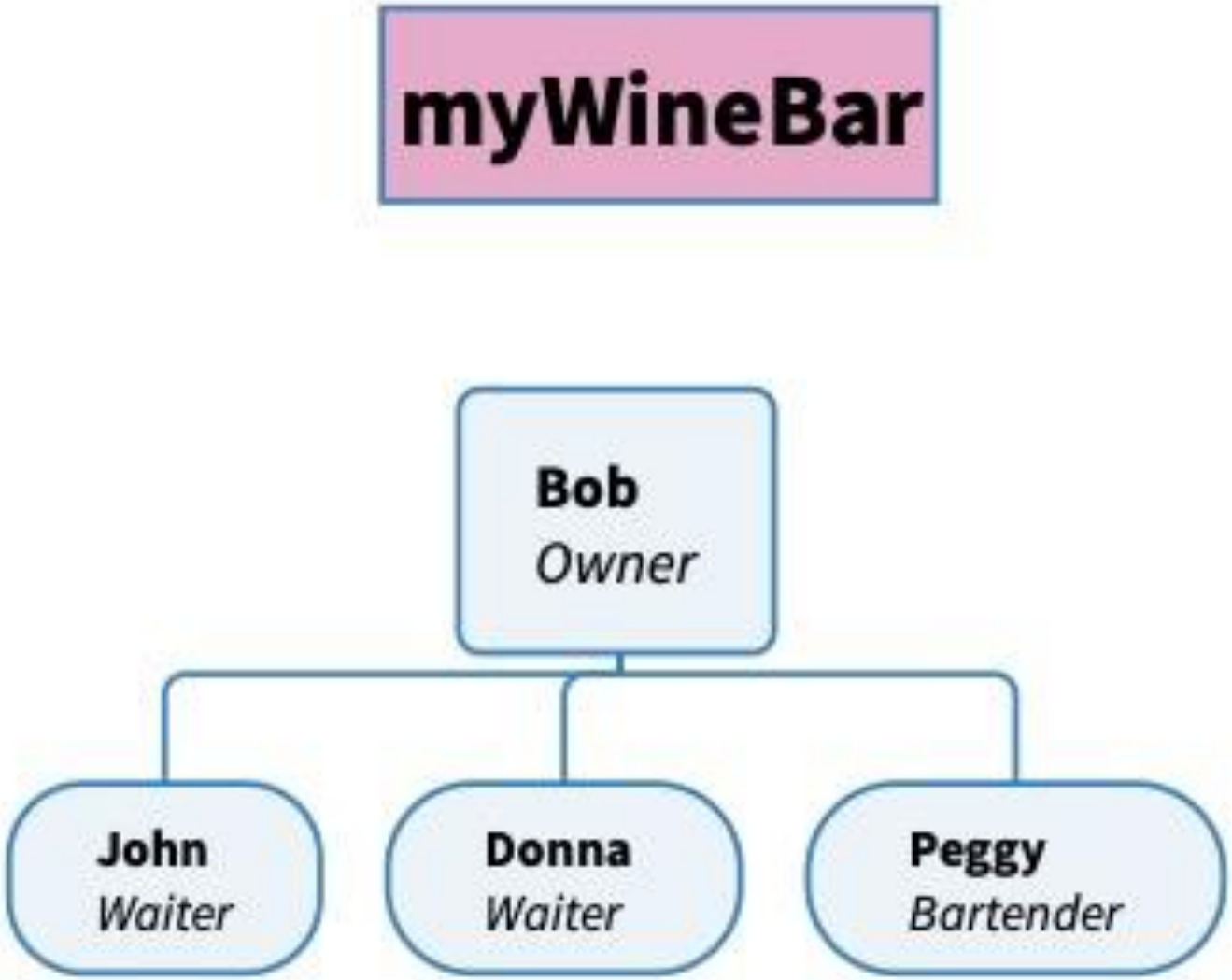


A stock and flow diagram generated by Gemini



myWineBar

Organization Chart



myWine Bar

(with applied principles adapted from Mobus (2022))

Systems may be composed of subsystems

- myWineBar is functionally decomposed into beverage and food subsystems.

Systems exhibit behavior; that is, they are nonstationary

- myWineBar is in an expansionary phase

Systems have a history

- myWineBar was founded 10 years ago and is still in the same location.

Systems are bounded

- myWineBar has only one location in a mid-sized city.

Systems are dynamic

- At times, myWineBar is stable, other times, growing, and sometimes shrinking. Currently, myWineBar is in an expansionary or growth phase.

Systems interact with other systems

- myWineBar interacts with suppliers and customers, government agencies

myWineBar

(with applied principles adapted from Mobus (2022))

Systems process information (some may process material or energy)

- myWineBar processes required MEM for operations

Systems are composed of networks

- Internal networks among operational agents as well as external networks among suppliers, customers, …

Systems regulate themselves through negative feedback

- myWineBar requires maintenance in terms of the number of agents, types of products sold, financial stability

Systems develop; systems evolve

- Development / evolution in response to environmental conditions

Systems have a life cycle (origin or startup, growth, mature, decline)

- Founded 10 years ago and in the growth stage

Systems will collapse at some point and die

- Not there yet

myWineBar

Description in Set-Theoretic Terms

- Let WB be the set of elements in the system (myWineBar)
  - WB = {owners, employees, customers, stocks of wine, food subsystem, wine and beer subsystem, sensors, boundary}
- Let O be the set of owners
  - O = {Bob}
- Let E be the set of employees
  - E = {John, Donna, Peggy}
- Let SN be the set of sensors
  - SN = {water leak, CO, security alarm, timers, cameras, fire and smoke detection}

myWineBar

Description in Set-Theoretic Terms

- Let NE be the set of new employees being hired
  - NE = {Martha, Lori}
- Reconfigured myWineBar employee set
  - E = E ∪ NE
  - E = {John, Donna, Peggy} ∪ {Martha, Lori}
  - E = {John, Donna, Peggy, Martha, Lori}
- Let NR be the set of employees retiring
  - NR = {Donna}
  - E = E \ NR
  - E = {John, Donna, Peggy, Martha, Lori} \ {Donna}
  - E = {John, Peggy, Martha, Lori}

myWineBar

Relations

- Interaction Relations (Examples)
  - Let E be a set of employees. E = {Bob, John, Donna, Peggy}
  - Let C be a set of customers. C = {Bobby, Ted, Carol, Alice}
  - Let I be the relation of which employees interact with which customers in terms of serving wine.
  - $I \subseteq E \times C$
  - I = {(x, y) | x serves y}, where $x \in E \text{ and } y \in C$
  - I = {(John, Bobby), (Peggy, Ted), (Peggy, Carol), (Peggy, Alice)}
  - Let K be the relation of which employees interact with which other employees
  - $K \subseteq E \times E$
  - K = {(x, y) | y reports to x }, where $x \in K \text{ and } y \in K$
  - K ={(Bob, John), {Bob, Donna), (Bob, Peggy)}

Many other relations exist, such as customer orders, inbound logistics, sales, and so on.

Components

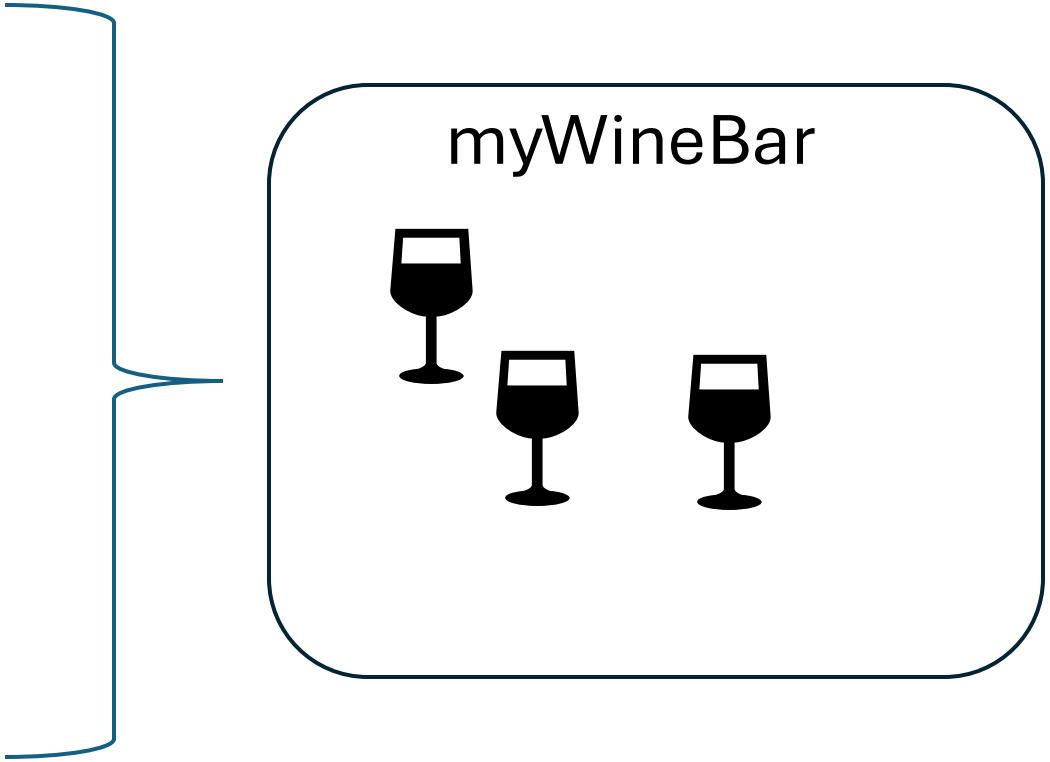
Sensors

- Sensors are used to detect, collect, and report
  - Water leak sensors detect any water leaks or spills and alert the wine staff of possible problems
  - Carbon monoxide sensors detect CO leaks and alert the wine staff of this hazard
  - Fire detection sensors detect fires, alert everyone within the wine bar, and potentially notify the fire station and start the water sprinklers to put out the fire.
  - Timing sensors open and close window shades at dawn / dusk automatically, while other sensors maintain the temperature at 68-70 degrees.
  - Indoor and outdoor cameras provide surveillance during off hours.

Inputs

Input Materials

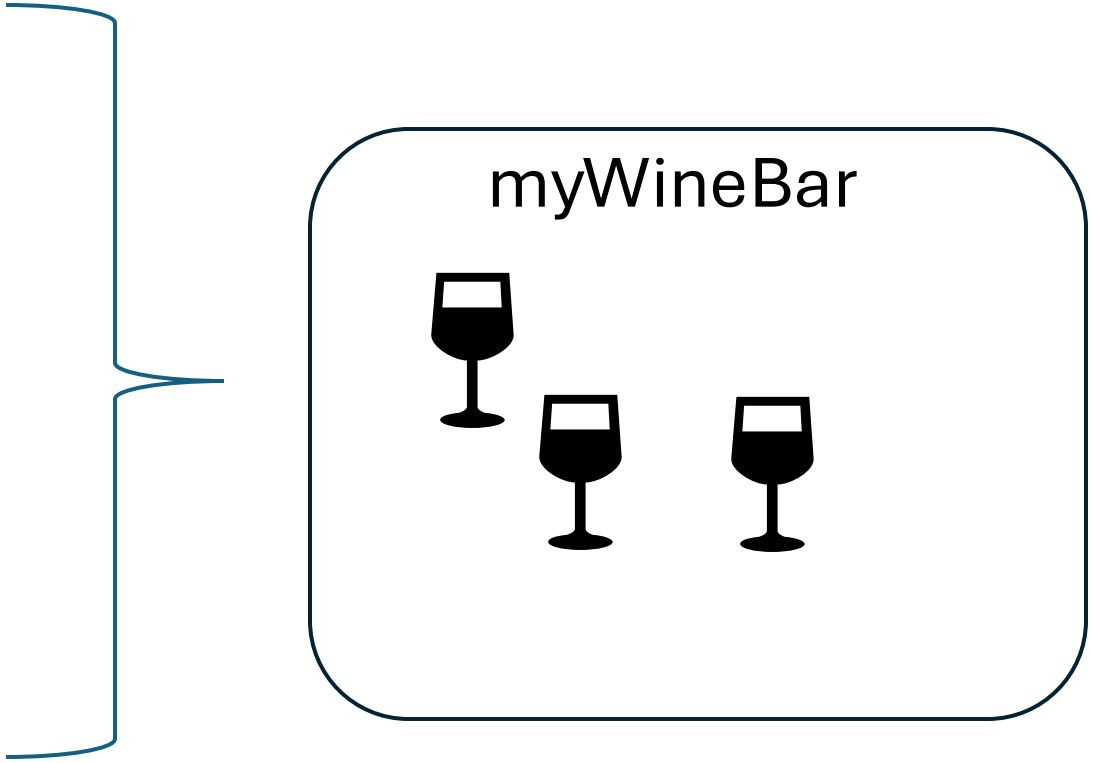
- Food and Wine
- Mail
- Packages



Add properties such as frequency, volume, cost, regulations, policies,

Input Energy

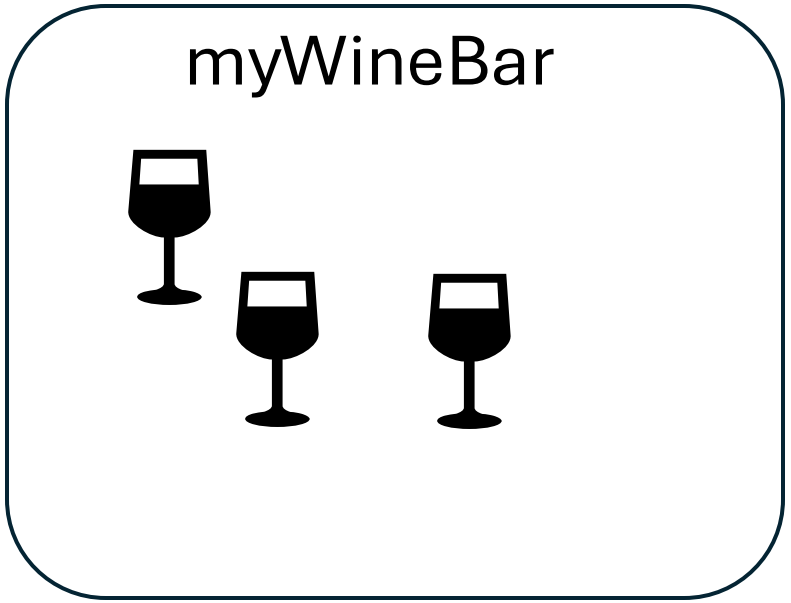
- Electricity
- Natural Gas
- Sunlight



Add properties such as frequency, volume, cost, regulations, policies,

Input Messages

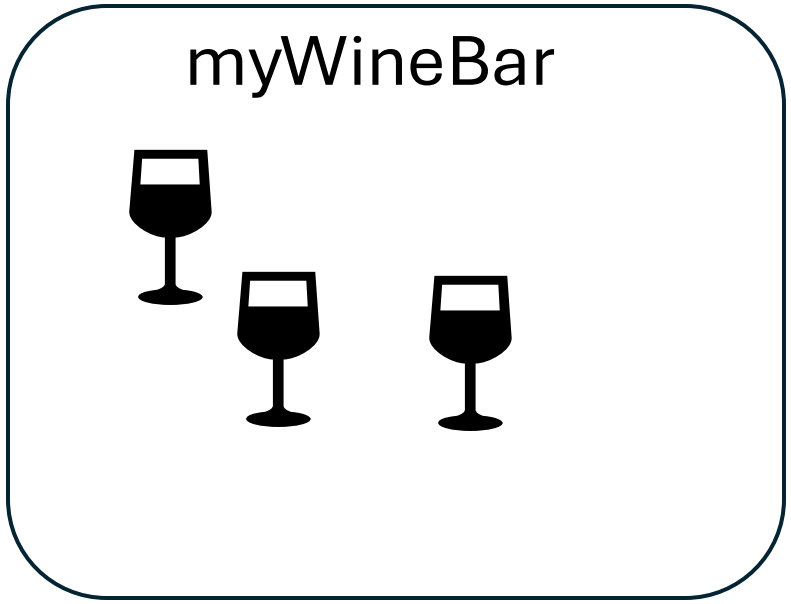
- Banks/Credit Unions
- Cable / Internet
- Commercial
  - News
  - Advertisements
- Government
  - Federal
  - State
  - County
  - City
- Insurance
- Management Company
- Suppliers



Add properties such as frequence, volume, cost, regulations, policies,

Outputs

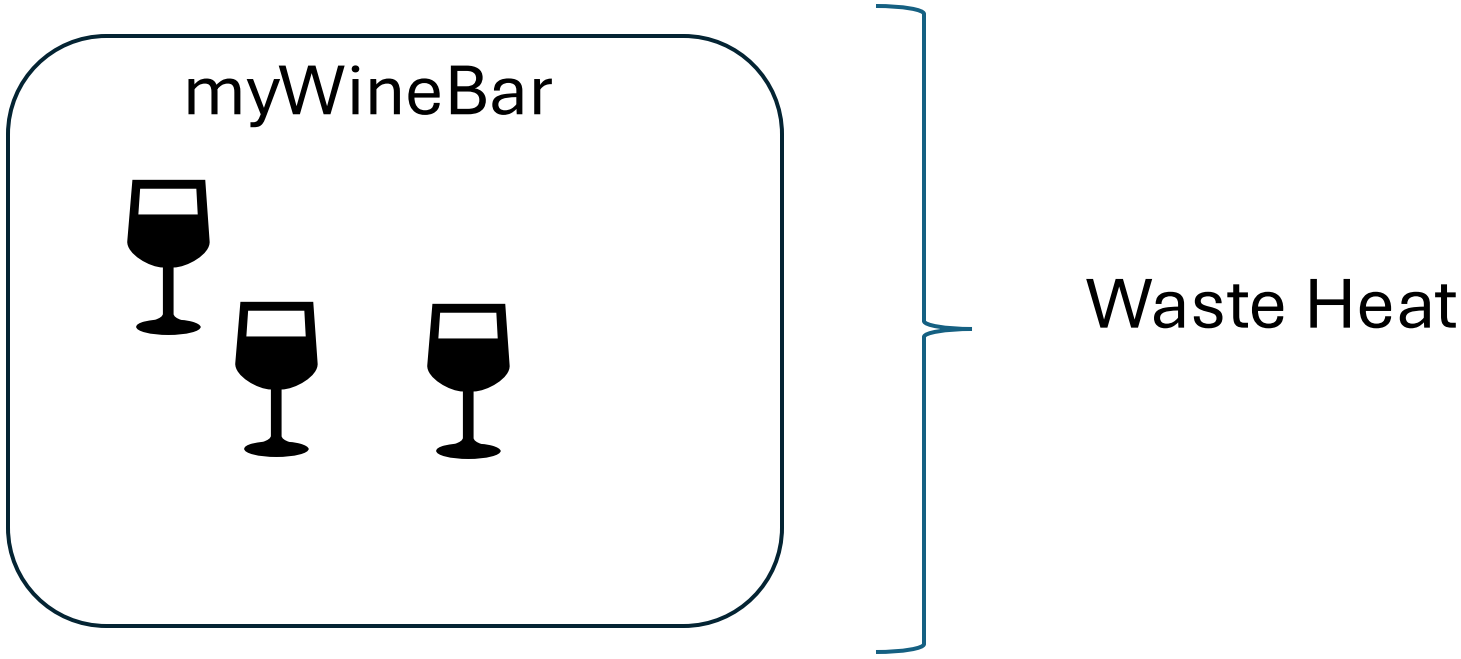
Output Materials



- Outgoing mail and packages
- Solid Waste
- Waste Water / Sewage

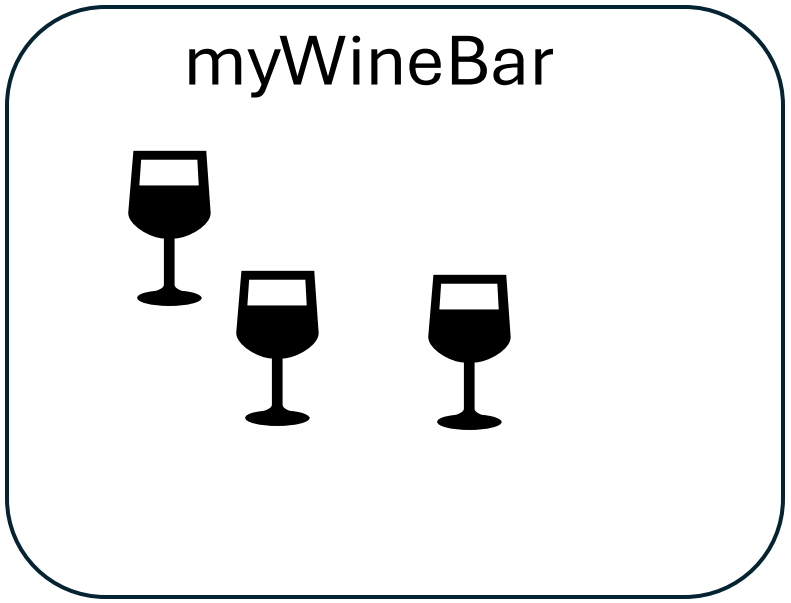
Add properties such as frequency, volume, cost, regulations, policies,

Output Energy



Add properties such as frequency, volume, cost, regulations, policies,

Output Messages



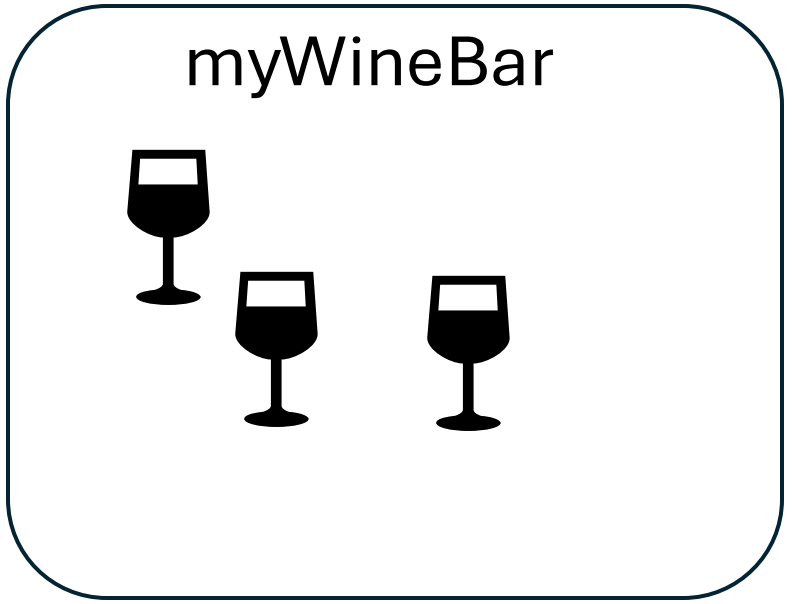
- Bank/Credit Union
- email
- Insurance
- Taxes
- Telephone Calls

Add properties such as frequency, volume, cost, regulations, policies,

Boundary

Boundary and Interfaces

- myWineBar boundary is the perimeter of the building
- Material Interfaces include:
  - Garage doors
  - Person doors
  - Windows
- Energy Interfaces include:
  - Electrical outlets
  - Windows
- Messages Interfaces include:
  - Internet connection points
  - Telephone connection points



Components

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Components

Possible Future Sensors

- Motion Detectors
  - Detect if a customer has one or two too many and alert staff
    - Could offer coffee, a taxi home, …
- Time Detector
  - Measure the amount of time spent in the wine bar
- Metal Detector
  - Determine and alert staff if customer is carrying or wearing a sufficient of metal to be a gun.

Operations Tips

- Frequent Customer Club
  - Customer pays $100 per year to join
  - Collect information such as birthdays, special anniversaries, entertainment interests, friends …
  - Discounts for some number of dollars spent. Say, a 10% discount for spending $100.00
  - Home delivery service
  - Notifications for birthdays, holidays, anniversaries, wine tasting, …
  - Free T-Shirt and ball cap with logo
- Other Possibilities
  - Collect data for Wednesday wine tasting (who comes, who doesn’t)
  - Special events / holiday parties
  - Game shows / karaoke
  - Possible TV for sports and other events. Audio could be muted.
  - Internet service
  - Catering service
  - Gift cards

Algorithms

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Database Possibilities

- Input MEM flows
- Throughput MEM flows
- MEM Stocks
- Output MEM flows
- MEM models

Can be described in tabular format and added to a database for processing

Porter's Value Chain

Inside myWineBar

Macro-processes leading to an organizations value.

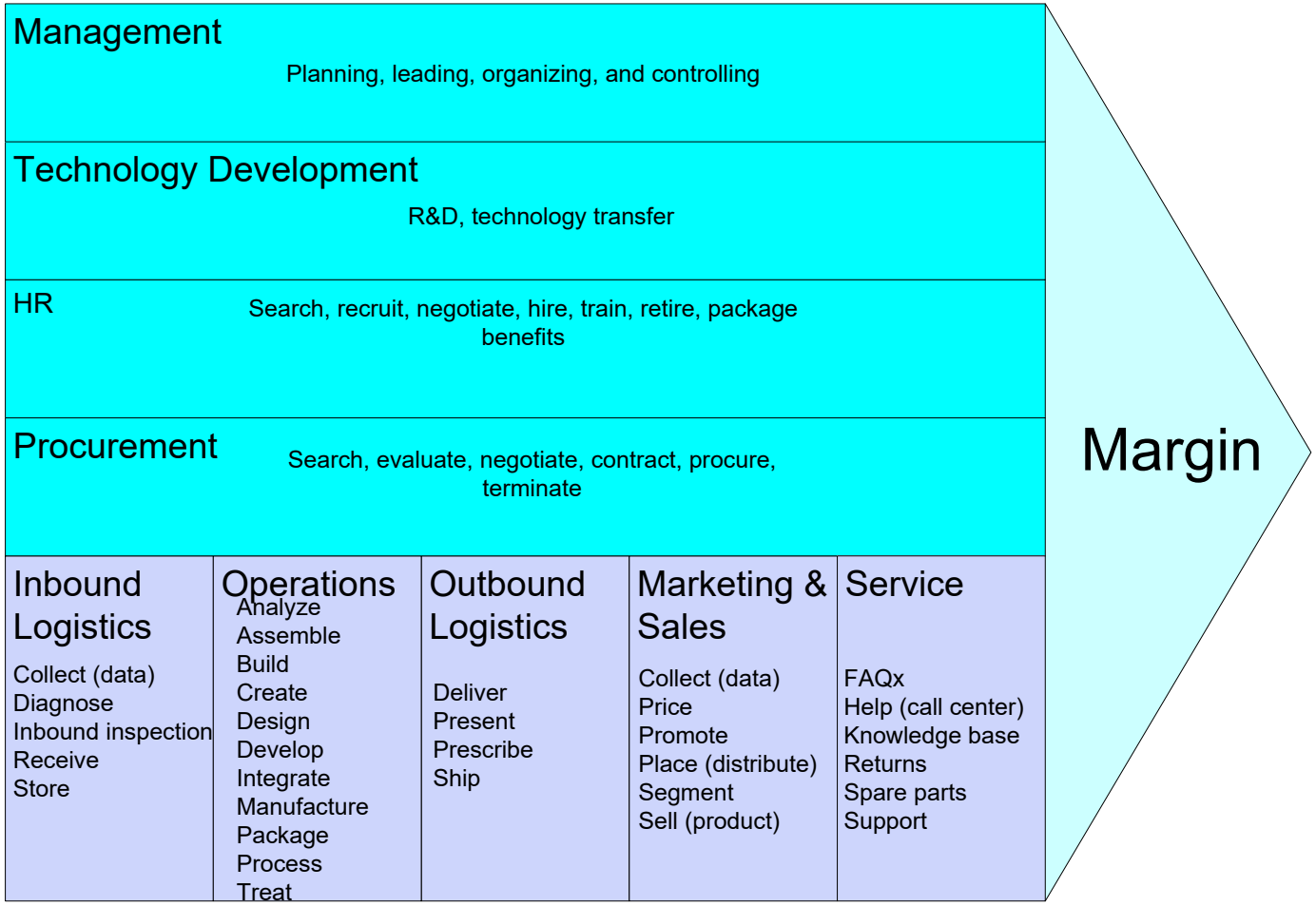
Each of these macro-processes can be deconstructed into several subprocesses.

Example: Management can be deconstructed into subprocesses planning, leading, organizing, and controlling.

Other or even different subprocesses could be included.

Each of these subprocesses / activities could be described via algorithms

Generic Value Chain



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Database Possibilities

- Input MEM flows
- Throughput MEM flows
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- Output MEM flows
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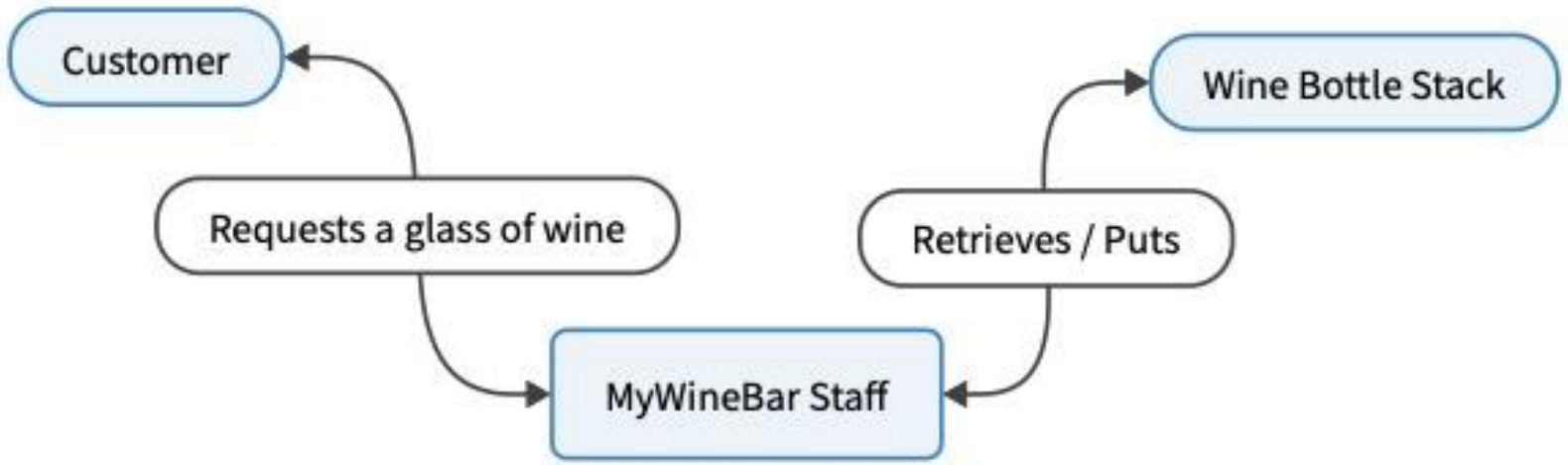
Customer Request

Ordering a Glass of Wine



This simplistic flow diagram illustrates a customer requests or orders for a glass of wine from myWineBar staff.

This flow can be described as a diagram, as an algorithm, or as a database table.

Algorithm

Waiter to Bartender to Waiter

1. Begin
2. John (waiter) takes Bobby's (customer) wine order (Pinot Gris) to Bob (bartender)
3. Bob selects a bottle of Pinot Gris
4. Bob pours a glass of wine
5. John hands the glass of wine to John
6. End

Algorithm

Waiter to Customer

1. Begin
2. Peggy (waiter) serves Ted (customer) a glass of wine
3. Peggy then asks Ted if he needs anything else.
4. If not, then End
5. Else take new order
6. Process it

Algorithm

Employee to Owner to Employee

1. Begin
2. Peggy (waiter) asks Bob (owner) for time off for a family emergency
3. Bob approves it
4. End

Algorithm

Processes can be described in one or more algorithms.

For example.

Customer Service

1. Begin
2. Take Wine Bar customer's order
3. Search for bottle of wine in cabinet (stored FIFO)
4. Pour a glass of wine
5. Serve to customer
6. Receive payment from customer
7. Is wine bottle empty?
8. If yes, toss into trash
9. If no, return wine bottle to wine cabinet
10. Customer requests another glass of wine?
11. Yes, go to step 3
12. No. Close

Data Base

Flows and Stocks

Flows and stocks of material, energy, and messages (MEM) can be described in terms of their properties or attributes and stored in a database for subsequent processing.

myWineBar

Database Possibilities

- Input MEM flows
- Throughput MEM flows
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- Output MEM flows
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Can be described in tabular format and added to a database for processing

Material Flow

Flow from Wine Distributor to My Wine Bar

Primary Key	Name	Supplier	Customer	Frequency	Size	Cost	When
InMat01	Rose	Wine Inc.	My Wine Bar	Weekly	1 case	$100	Mondays
InMat02	Pinot Grig	Wine Inc	My Wine Bar	Weekly	2 cases	$150	Tuesdays
	What	Who	Who	When			When

Material Flow

Flow from Walk-in Customer to My Wine Bar

Primary Key	Name	Supplier	Customer	Frequency	Size	Cost	When
InMat01	Rose	My Wine Bar	Wine Bar Customer	On request	1 glass	$10	Varies
InMat02	Pinot Grig	My Wine Bar	Wine Bar Customer	On request	1 glass	$10	Varies
	What	Who	Who	When			When

Energy Flow

Flow from Electric Utility to Wine Bar

Primary Key	Name	Supplier	Customer	Frequency	Size	Cost	Timing
InFlowE1	Electricity	Electric Utility	My Wine Bar	24/7	50 KWH	$100/mo	Continuous
InFlowE2	Natural Gas	Wine Bar	My Wine Bar	24/7	1000 Cubic Feet	$200/mo	Continuous
	What	Who	Who	When			When

Message Flow

Message Flow from Electric Utility to Wine Bar

Primary Key	Name	Supplier	Customer	Frequency	Size	Cost	Timing
inMsg01	Invoice	Electric Co	My Wine Bar	Weekly	1 page	$50	Varies
	What	Who	Who	When			When

Message Flow

Message Flow from myWineBar to Wine Supplier

Primary Key	Name	Supplier	Customer	Frequency	Size	Cost	Timing
outMsg01	Order	Wine Inc.	My Wine Bar	Weekly	1 page	$500	Varies
outMsg02	Order	XYZ Wine	My Wine Bar	Weekly	1 page	$600	Varies
	What	Who	Who	When			When

Collapse

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Collapse 1

- Waiters and bartenders report to the owner
- If a waiter or bartender leave for whatever reason, the owner could replace them, train them as needed, and myWineBar could continue to function.
- Should the owner leave for whatever reason, it could be more difficult to find a replacement, in which case myWineBar could cease to function and collapse.

Networks with few primary or key hubs or nodes are susceptible to failure when one or more are deactivated

myWineBar

Collapse 2

- myWineBar could also collapse for various reasons
  - Fewer to zero customers
  - Environmental crises such as earthquake, fire, flood

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Other Notes

Components

Possible Future Sensors

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  - Internet service
  - Catering service
  - Gift cards

Multifinality

A Wine Bar Example

Other Notes

- A "profit making system" from the perspective of management and owners
- A "distribution system" from the perspective of the suppliers
- An "employment system" from the perspective of employees
- A ”shopping system" from the perspective of customers
- An "entertainment system" from the perspective of customers
- A ”workplace” from the prospective of remote employees
- A "social system" from the perspective of residents and customers
- A "dating system" from the perspective of single customers

Improvements Using Meadows Leverage Points

Tips From Gemini

- To improve the operations of a small wine bar, you can apply Meadows' leverage points, focusing on three key areas: **rules of the system**, **structure of the system**, and the **mindset or paradigm** that underpins it.
- By targeting these leverage points, you can achieve more significant and lasting change than by simply tweaking minor operational details.

Rules of the System

- This level of leverage involves changing the regulations, incentives, and constraints that govern the wine bar's operation.
  - **Change the Incentives:** Instead of just incentivizing sales volume, you could reward staff for customer retention and positive reviews. This shifts the focus from short-term transactions to long-term relationships and customer loyalty. For example, a bonus could be tied to the number of repeat customers.
  - **Change the Constraints:** You can alter the constraints on the menu and pricing. Instead of a static menu, introduce a dynamic, weekly-changing wine list that allows for experimentation and keeps the offerings fresh. This addresses the constraint of a limited, unengaging selection. You could also set a constraint on waste by implementing a "flight of the week" feature that uses up open bottles nearing their expiration, reducing spoilage and increasing profitability.
  - **Change the Self-Organization:** Allow staff more autonomy in curating the wine list and suggesting pairings. This empowers them to take ownership and use their expertise, leading to better customer experiences and a more engaged team. It changes the rule from "manager decides everything" to a more collaborative approach.

Structure of the System

This level involves altering the physical and organizational structure of the wine bar.

- **Change the Stock and Flows:** Rethink the bar's inventory management (stock) and the rate at which wine is consumed and replenished (flows). Implement a just-in-time inventory system to reduce the amount of capital tied up in stock and minimize waste. You could also change the flow by offering different pour sizes (e.g., 2-ounce tasting pours) to encourage customers to try more wines without committing to a full glass, increasing the speed of product flow.
- **Change the Feedback Loops:** Introduce a more direct and immediate feedback loop from customers to the staff and management. Instead of relying on a review site, you could use a simple QR code at each table that links to a quick survey, allowing you to gather real-time feedback on service and wine quality. This accelerates the feedback loop, enabling faster adjustments to operations.
- **Change the Information Flow:** Improve the flow of information among staff. Instead of verbal updates, use a shared digital platform or app where staff can log tasting notes, customer preferences, and inventory levels. This ensures everyone has access to the same information, leading to better service and a more cohesive team.

Mindset or Paradigm

- This is the highest level of leverage, focusing on the fundamental beliefs and assumptions that shape the entire system.
  - **Shift from a Transactional to a Relational Mindset:** The core belief of the business should shift from "we sell wine" to "we create an experience." This paradigm shift affects everything: the decor, the staff's training, and the marketing message. The goal is no longer just to sell a bottle but to build a community and a long-lasting relationship with the customer.
  - **Shift from a Scarcity to an Abundance Mindset:** Instead of viewing your small size as a limitation, see it as an advantage. This paradigm shift means you can offer a more curated, personal experience. You can focus on unique, small-batch wines that a larger establishment couldn't carry. This changes the narrative from "we don't have everything" to "we have a hand-selected collection of the best."
  - **Embrace a Learning and Adaptable Paradigm:** Change the core belief from "this is how we've always done it" to "we are a continuously evolving business." This encourages a culture of experimentation and learning. You could host "wine lab" nights where staff and customers collaboratively explore new varietals and provide feedback, embedding a culture of continuous improvement into the bar's DNA.

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Thank you!