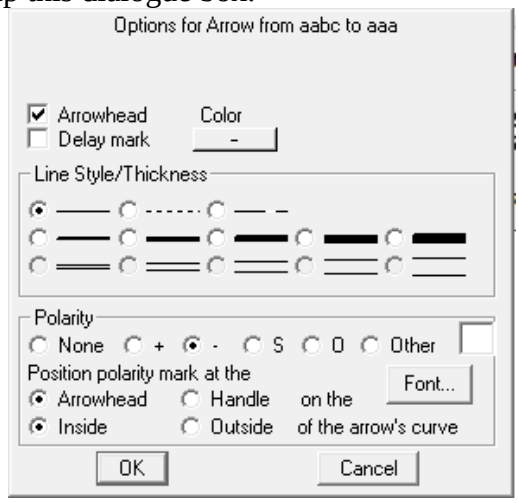
Name: Chia Wen CHENG

EAS 550/STRATEGY 566: Systems Thinking for Sustainable Development

Lab 2 Causal loop diagrams
Instructions: Steps to draw a Causal Loop Diagram in Vensim -- **Windows**

1) First, create a new model using the default simulation time settings.

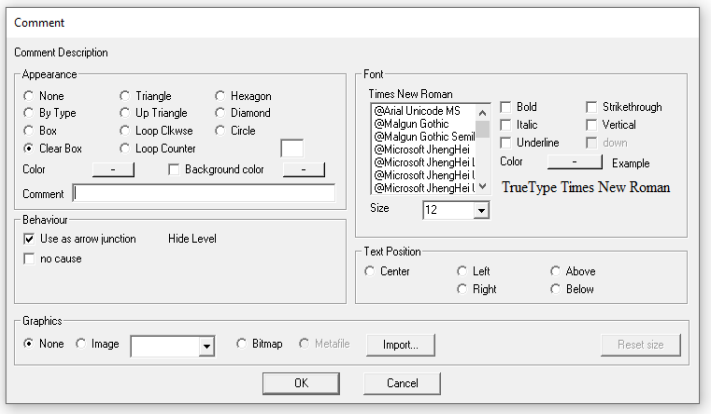
2) Create two variables and connect them with an arrow. Right-click on the arrowhead of the blue arrow to bring up this dialogue box.



In 'Polarity' you can choose the + or – mark.

The + and – marks can also be S or O marks. S stands for a change in one variable produces a change in the other variable in the *same* direction, and O indicates an *opposite* direction.

3) In this lab, you will be creating several Causal Loop Diagrams. To name your loops, use the 'Comment' tool, and click on the diagram where you want the loop sign to open this dialogue box.

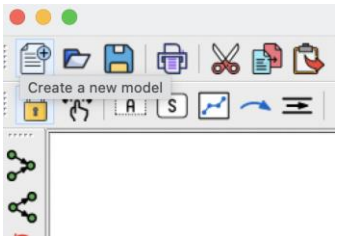


In 'Appearance' select 'Loop Clkwse' or 'Loop Counter'. Put the name of your loop in 'Comment' and select "Above" as the position of the text in 'Text Position'. In 'Graphics' select 'Image', and then select the correct sign (the sign will be placed in the center of the loop).

Name: Chia Wen CHENG

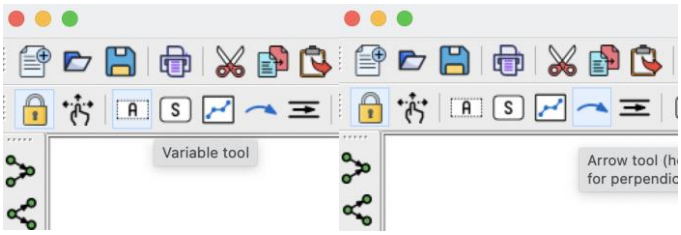
Instructions: Steps to draw a Causal Loop Diagram in Vensim -- **Mac**

1) First, create a new model using the default simulation time settings.

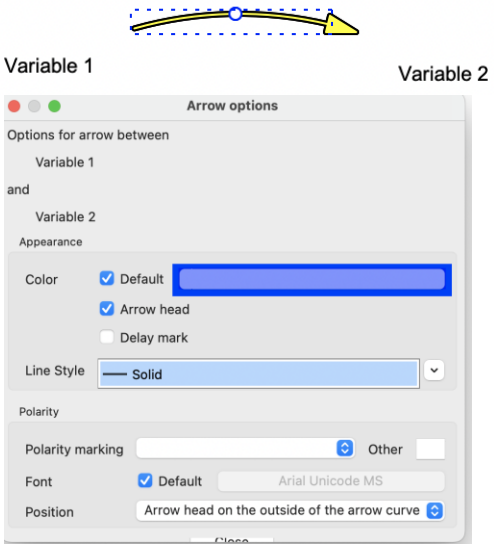


2) Create two variables and connect them with an arrow. Right-click on the hollow circle in the middle of the blue arrow to bring up this dialogue box.

- Use Variable tool and Arrow tool to create two variables and connect them with an arrow.



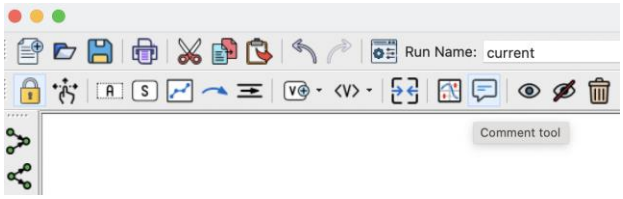
- Right-click (Or use two fingers to click if you use trackpad) on the hollow circle in the middle of the blue arrow to bring up the dialogue box.

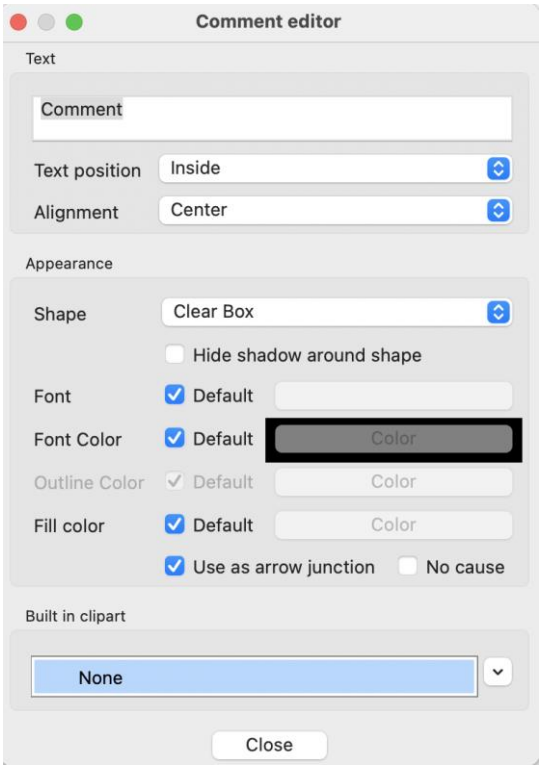


In 'Polarity marking' you can choose the + or – mark.

The + and – marks can also be S or O marks. S stands for a change in one variable produces a change in the other variable in the *same* direction, and O indicates an *opposite* direction.

3) In this lab, you will be creating several Causal Loop Diagrams. To name your loops, use the 'Comment' tool, and click on the diagram where you want the loop sign to open this dialogue box.
   - 'Comment' tool





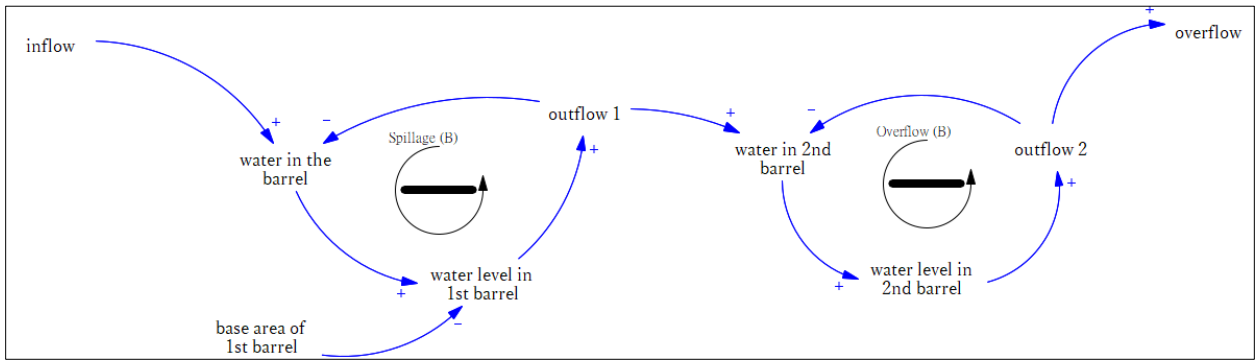
In 'Shape' select 'Loop Clkwse' or 'Loop Counter'. Put the name of your loop in 'Comment' and select "Above" as the position of the text in 'Text Position'. In 'Built in clipart' select the correct sign (the sign will be placed in the center of the loop).

Name: Chia Wen CHENG

Problems:
Convert the following system descriptions into causal loop diagrams. Remember that variable names should be nouns or noun phrases, and each link must represent causation. Label the *polarity of both links and loops* and *name all loops*.

1. Water Tanks

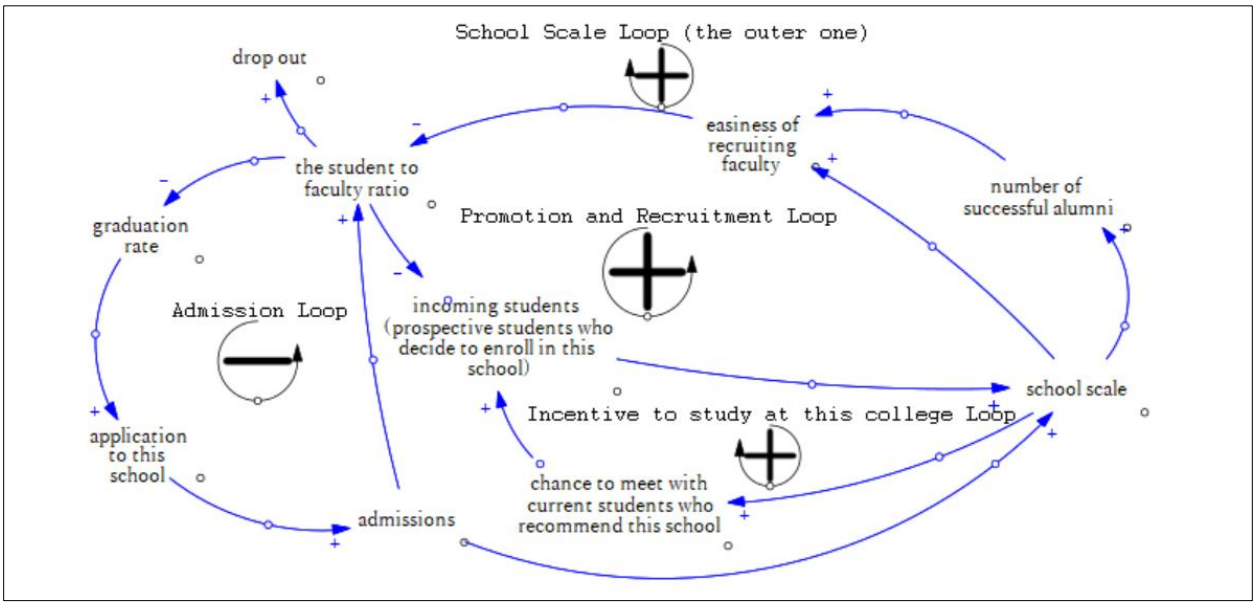
I collect rainwater from my gutters to water my garden, but it's been a really rainy fall so I've had to buy a second rain barrel. The rainwater in the gutter flows directly into the first rain barrel, which isn't very big. Once that barrel gets filled to a certain level, a hose carries water to the second barrel which is larger. However, if we get a big rainstorm the second barrel can get completely full, and it ends up spilling everywhere.



Name: Chia Wen CHENG

2. College Admissions

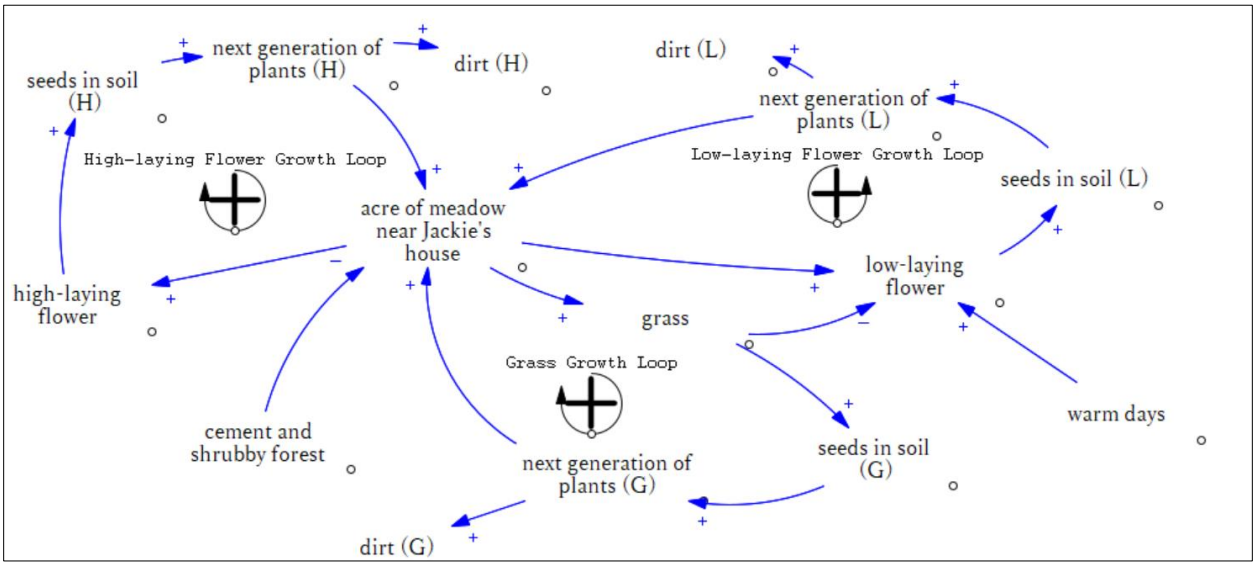
The admissions team of a small, growing college did some research to try and figure out what influences the number of students at the institution. Here are some of the core lessons they learned. Currently, the university has a pretty good graduation rate, but some students do drop out for various reasons. One key influence is the student to faculty ratio, where high numbers of students to a single instructor means that faculty can't devote a lot of time to struggling students. However, recruiting faculty is tough because the school is still small and there aren't many successful alumni who can promote the institution to potential faculty members. The team also knows, from a survey of prospective students, that having a low student to faculty ratio is also appealing when students are considering different schools. Once students apply, they have a good chance of being admitted, but some do decide to go somewhere else even if they get accepted. The admissions team has noticed that prospective students are more likely to choose this college if they got to meet current students who recommended the school.



Name: Chia Wen CHENG

3. Flower Meadow

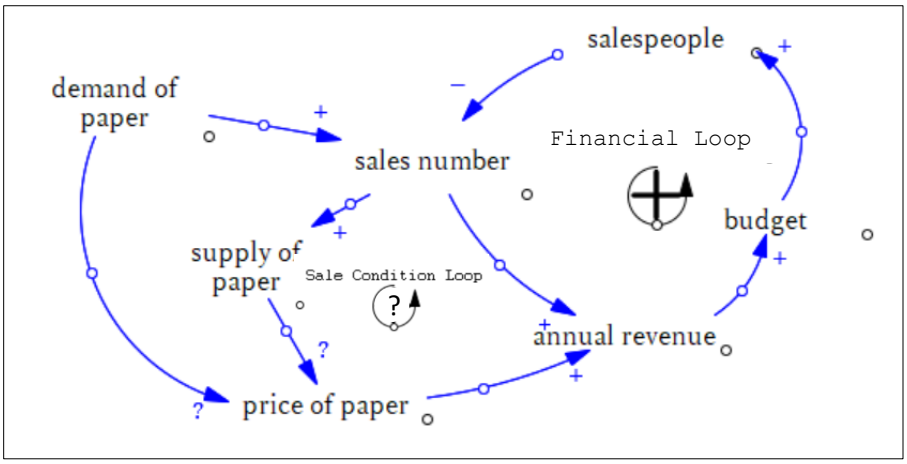
There's a meadow near Jackie's house that blooms every spring and she's noticed some patterns in the flowers over the years. Firstly, besides the flowers there is only grass growing in the meadow, which usually grows pretty tall and can block the low-laying flowers from light. By the end of spring, the meadow is usually either patches of grass or patches of flowers, which die back to dirt during the winter. Jackie wants to make a simple CLD of how the flowers and grass interact based on her observations. Firstly, both the flowers and the grass create seeds that stay in the soil over winter and grow the next generation of plants. The plants in the meadow grow quickly in the spring but can only grow to the boundaries of the meadow because on the other sides are cement and shrubby forest. If there are enough early season warm days, the flowers can get established and not die to the grass overshadowing them.



Name: Chia Wen CHENG

4. Paper Company

A paper company is trying to figure out their dynamics, specifically the interactions between their work force, sales, and growth. They have a certain number of salespeople who interface with customers and sell reems of paper. Using their sales numbers and the price of paper, the company can calculate their annual revenue. Depending on the revenue from the sales department, the company increases or decreases the department's budget which they can use to hire new people. Occasionally, salespeople leave for other positions or retire. Also, the larger the team the less effective they are at sales because the manager struggles to coordinate a lot of people.



Name: Chia Wen CHENG

5. Spreading a Cold

Sasha works for the public health department of his city and is trying to understand how the cold gets spread in a community. He's identified three main populations: susceptible people, infected people, and recovered people. Luckily once people get a cold and recover, they can't catch the strain again. A couple of factors influence how people move between these three populations. Firstly, the number of contacts per day for both susceptible people and infected people, and how infectious the cold is. Once someone has been exposed to the virus and contracted it, it takes a few days for them to get symptoms and become infectious themselves. Then, it takes a few more days for them to recover and become immune. During that time of infection, they can spread the cold to more people depending on their behavior. The city has recommended that infected people stay home and isolate themselves, and that healthy people make sure to wash their hands often to try and avoid catching the cold.