

10 Steps to SD Modelling with Vensim®

1. Declare what to know.

What do you want to know?
Make your interest explicit.

Example
Future of your country
Long term plan of your firm

2. Define a variable indicating states of your interest

What variable do you measure
conditions around your interests by?

Example
Population, profit, level of inventory...

3. Specify what kind of resource your interests' variables consist of.

What are units contained in your variables?

Example
Human (population), money (profit),
goods (inventory)...

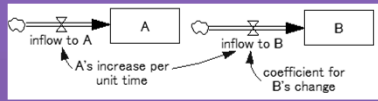
4. Find states in which resources specified in step 3 can be.

Example
Children, Adults, Elderly (human)
Accounts receivable, Cash and Deposit (money)
In production, In transit, Inventory (goods)

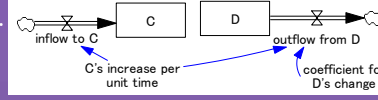
8. Connect stock-flows.

Guidelines

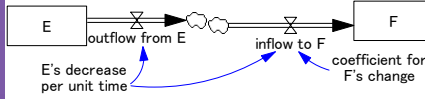
• Stock A's increase leads to stock B's increase.



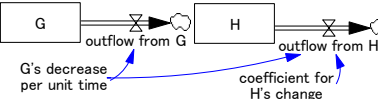
• Stock C's increase leads to stock D's decrease.



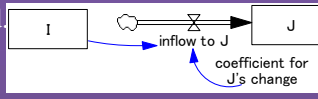
• Stock E's decrease leads to stock F's increase.



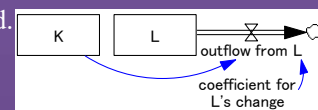
• Stock G's decrease leads to stock H's decrease.



• Stock I's volume influences stock J's increase speed.



• Stock K's volume influences stock L's decrease speed.



• Flow/convertor Mx is calculated on the value of variable Nx.



iii

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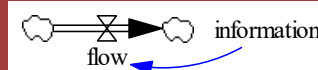
7. For each information, answer to questions below from the top. When answering yes, follow the instruction, and repeat for another flow/convertor.

(i) Is it constant? Yes: Remember it.

(ii) Has it been already included in the diagram?

Yes: Put causal link from the information to the flow/convertor.

Flow example



(iii) Is it a state of anything?

Yes: Go to step 2, and deal with the information as your interest.

(iv) Is it a change volume of anything in a period?

Yes: Go to step 2, and deal with the information as your interest.

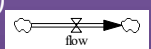
(v) If all answers for all question are "No," put the information as a converter, then go to step 6.

5. Draw your stock flow diagram

Amount/number of a resource in a state: stock



Transition between stocks, a source/sink: flow
(Edge clouds can be substituted by stocks.)



6. List necessary information to calculate each flow/convertor generated in step 5.
There may be no converters.

9. Formalize your model.

Stocks: its initial value.

Flows and Converters

- input α (positive), $1/\text{input } \alpha$ (negative); α is a marginal change volume
- Outflow from a stock s which keeps resources for a certain time t : s/t
- Experience/subjective probability: *monotonic graphical function*
- If necessary, add converters and causal links to existing flows and converters.
- Caution! Never add up or subtract ones with different units.

10. Check whether your interest variable (step 2) is included in your model.

If no, add it as a converter linked to appropriate variables.

Example
Population consists of all cohorts of generations

Goal and next Start: Do Simulations!

At least, you need to check these points.

- Check whether your model's behavior is reasonable.
- Test whether your model's behavior fit in historical data.
- Simulate under the various scenarios under from subtle different

conditions to extreme one.

- Do monte Carlo simulation with appropriate distribution random numbers instead of constants in your model and check the ranges of variables' possible volume.
- Find the key variable with leverage and *think wider!*