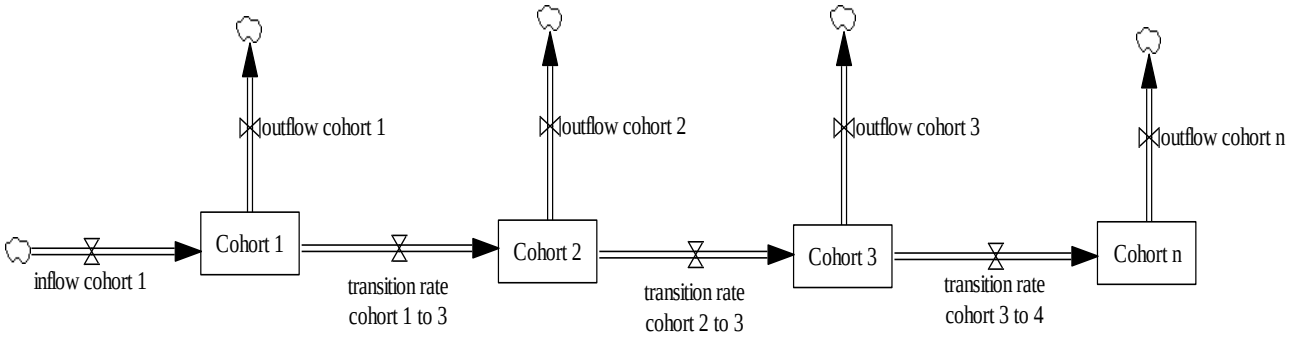
AGING REPRESENTATION

Giuseppe Noce

nocegius@teletu.it

We know stock and flow are determinant to represent a system. Delay could be used to simulate a process without change during it. But sometime inflow or outflow adds in the process and changed the flow of elements. Delay function could not work successfully to model the real situation.

We can think about the hiring of new employees, the demography study of population aging, the aging of equipment, the supply. Delay is not allowed representation. We need aging chain structure represented in the picture.



Stock is called cohort. In each cohort individual is mixed. The entry and exit probability of each individual is independent. Number of cohort is the result of required approximation within each cohort. We can also use one year cohort and individual enters and moves out of the level each year. The transition rate cohort is generally a first-order delay. Sometime pipeline delay is used to represent the behaviour.

Demographic study uses aging structure. Health system and disease simulation could be improved if aging chain will be used. Biological system (such as insect development) and social system (such as marriage duration) could be easy captured by

aging chains. In general an aging chain structure is used to represent age-dependent system (Sterman, 2000).

Eberlein and Thompson (2013) discuss a new way to represent an aging chain. The function mathematic is described by Eberlein and Thompson (2013) and Eberlein and coll. (2012). This new way is called *continuous cohorting* and means "*the member of each age cohort are update on every computational interval so that there is no anomalous up and down within a year and no need for an extra indirectly measured cohort to help with initialization"*. The function creates an age disaggregation of population so continuous complete movement of population between two cohorts at each strep is possible. The discrete cohort shifting is overcame and the tracking of individual are more accurately.

Continuous cohorting could be applied to any (animate and inanimate) population allowed the best approximation to behaviour. Continuous cohorting rather than aging chain is recommended when we are looking at demographic or aging aspects of the real world.

References

Eberlein RL, Thompson JP and Matchar DB (2012) *Chronological aging in continuous time* Proceedings of the 30th International Conference of the System Dynamics Society July 22-26, 2012 Switzerland

Eberlein RL and Thompson JP (2013) *Precise modelling as aging population* System Dynamics Review vol 29 No 2(April 2013): 87-101

Sterman, J (2000) *Business Dynamics System Thinking and Modelling for a Complex World* McGraw-Hill

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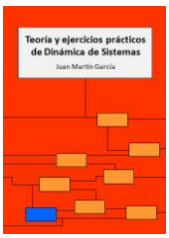 Ejercicios	 **Curso Básico Intensivo en Dinámica de Sistemas**
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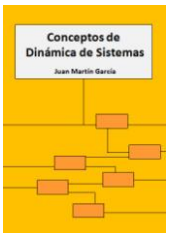
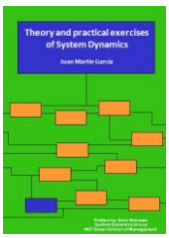
 Conceptos	 **Modelos de simulación en ecología y medioambiente**
 English	 **Planificación de empresas con modelos de simulación**
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