# Dynamical narratives: How do systems develop over time?

## Fundamental Principle of ***system dynamics*** (***SD***): ***Narrative emerges from structure!***

### ***Structure-process*** ***diagram (SPD) of the Rabbits dynamical system***:

(birth-rate)

(death-rate)

(Rabbits)

(specific birth-rate)

(lifespan)

## ***Designing*** the Rabbits dynamical system

### ***Stocks*** (or ***state variables***):

, where (*Here, units are important!*)

### Dynamical ***processes***:

### Structural ***relations***:

### Numerical ***parameters***:

### ***Differential equations*** (***DE***):

(*From now on, we will ignore units for convenience!*)

## ***Implementing*** the Rabbits narrative

### Behaviour over time (***BOT***):

In general, biological systems are *never* exactly integrable, but we have simplified the Rabbits system so greatly (by ignoring migration and predation) that we can calculate this integral exactly:

**We are *very* lucky:** This is probably the *only* time we will be able to integrate our DEs exactly! From now on, we will need to calculate BOTs *numerically* using the julia DynamicalSystems package.