

Lab Session II

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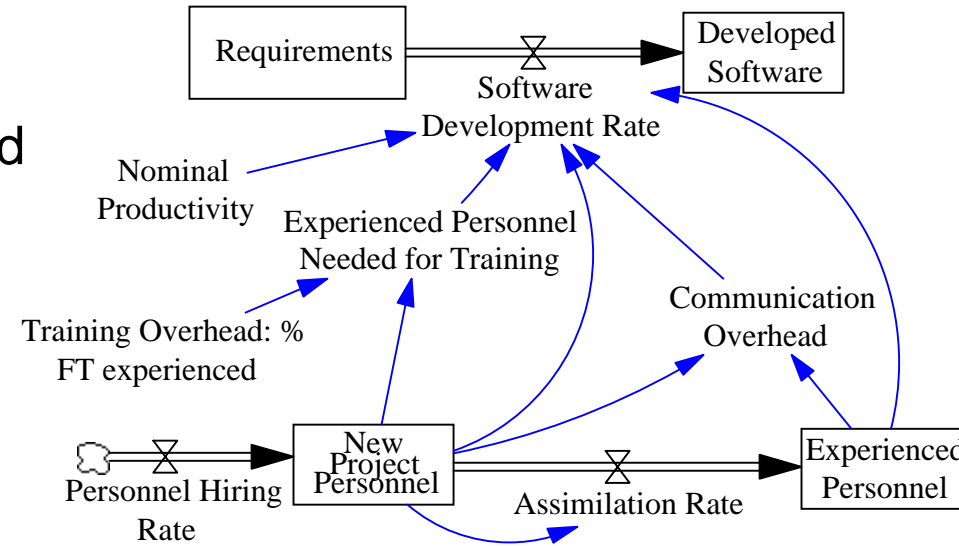
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Lab Session II

- This session requires successful completion of the 1st Lab and, thus, familiarity with Vensim PLE

Lab II - Brooks' law Model

- Start VensimPLE and load *brooks_law.mdl* (this model closely follows the one proposed by Madachy and Boehm)



- Simulate the model under different scenarios regarding people being hired
 - modify the equation that defines “personnel hiring rate” (you may need to consult help on function *Pulse*)
personnel hiring rate = $2 * \text{PULSE}(120, 10)$ equivalent to hire 1.5 people per day during 10 days starting at day 120; total people hired = 20
personnel hiring rate = $1 * \text{PULSE}(92, 5)$ equivalent to hire 1.0 person per day during 10 days starting at day 92; total people hired = 5
 - run the model and observe the effects of changes of “personal hiring rate” in the variable “software development rate”
 - does the comparison of different policies (e.g. no hiring, vs hiring large team) confirms Brooks' law that “...adding people to a late project makes it later...”?

Lab II - Brooks' law Model

- Introduce a **synergy** term in the “Software Development Rate” equation as an additional multiplier

$$0.67 + 0.7 * [\text{Team_Size} / (\text{Team_Size} + 0.7)]$$

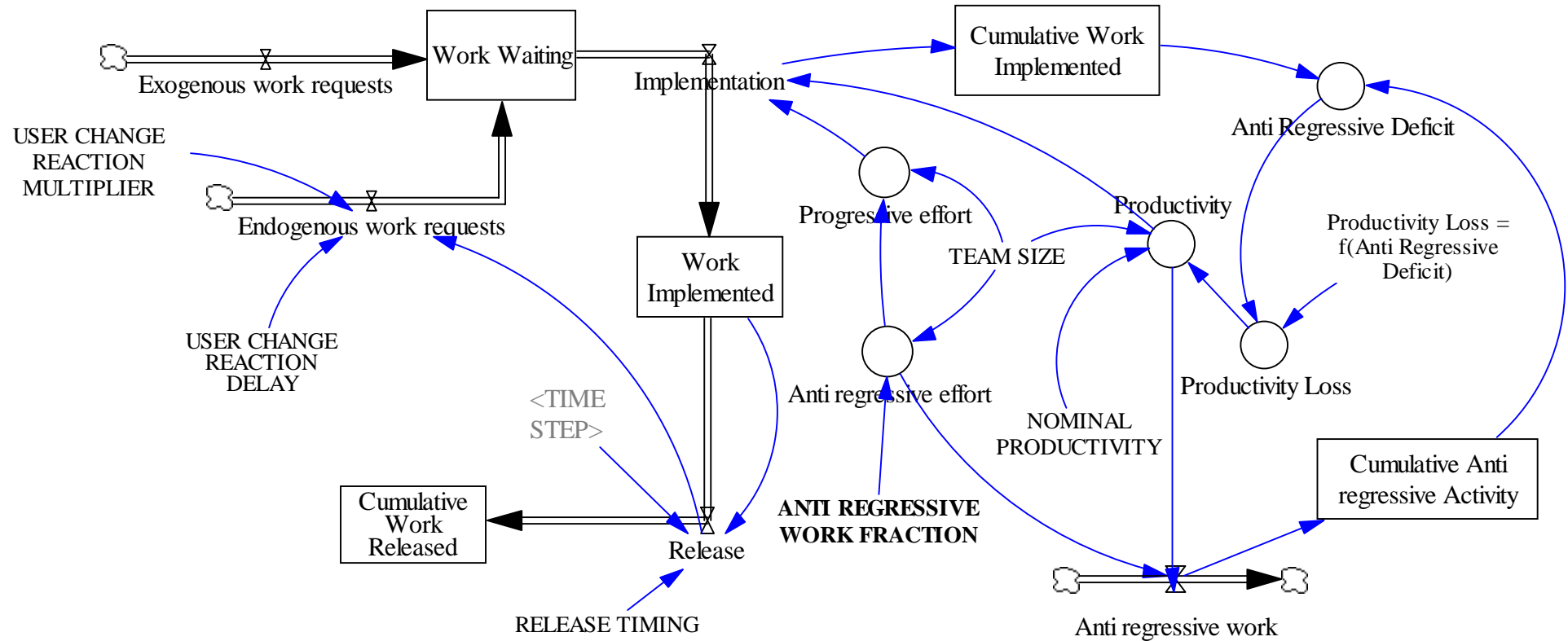
Define Team Size as

“New Project Personnel + Experienced Personnel”

- Repeat the execution of the model under different “personnel hiring rates”
- What is the overall effect of this new synergy term?

Lab II - Lehman's 2nd law "Increasing Complexity" model

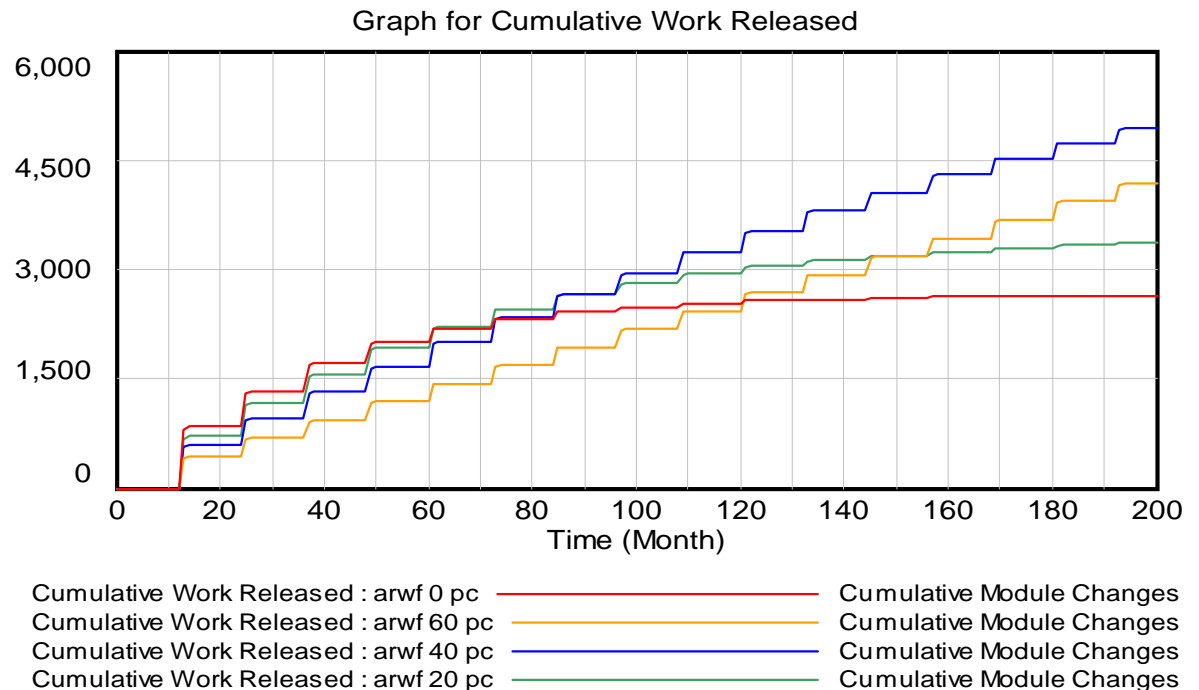
- Start VensimPLE
- Load *evolution1rev.mdl*
- In the top menu select: *View->Show Hidden->All*



Lab II - Lehman's 2nd law "Increasing Complexity" model

- Simulate the model under different scenarios regarding Anti_regressive_work fraction
 - 0 indicates no anti-regressive effort
 - 1 indicates 100 percent of resources applied to anti-regressive effort
- Observe the effects of various policies on Cumulative_Work_Released
- Which is the "optimal" evolution policy?
- What is the effect of Anti_regressive_work fraction closer to 1.0 after 200 months?

- You should be able to get a plot like this ->



Lab II - Optional Work

- Refine and extend the *evolution1rev.mdl* model by including all suitable variables and elements from Brooks' law model; that is, try to “merge” the two models
 - you can use “cut and paste” facilities of Vensim PLE
 - are there any inconsistencies between the 2 models that must be resolved, how?
 - would be the output of the refined model more “realistic” than that of the individual models on its own? (*Hint: Brooks' law model is a model of short term behaviour (e.g. days) whilst evolution1rev.mdl addresses long-term behaviour*)
- Try for a few minutes to consider how you would design a sequence of simulations of the model (e.g., changing systematically two parameters) that may enable you to get valuable lessons for management from the *evolution1rev.mdl*. You may wish to explore Vensim PLE facilities in this regard
- Give a look at the full Vensim PLE manual, provided as a PDF file, so that you get an idea of the several features provided to analyse model behaviour (e.g. sensitivity analysis, Monte-Carlo simulation, etc)