

CT561 Assignment 1 (15% of final grade)

The goal of this assignment is to explore the impact of the employee resource profile on the amount of time required to completed a coding project.

There are a number of elements to the model:

- An “ageing chain” structure that models **Rookies** and their career progression to becoming **Experienced**. A variable should be added to the model so that career progression can be switched on and off, to support running two different scenarios. Assume that the average promotion time is 100 days, and this follows a *second order delay structure*.
- A “software construction” structure that models code being completed, and rework being generated (similar to what was covered in a recent lecture).
- The **Code Remaining** stock flows into *four* different stocks. Successfully written code (based on the yield fraction) flows into either **Code Completed Rookies** or **Code Completed Experienced**. Code with flaws flows into either of the stocks **Undiscovered Rework Rookies** or **Undiscovered Rework Experienced**.
- The stocks **Undiscovered Rework Rookies** and **Undiscovered Rework Experienced** flow back into the **Code Remaining Stock**, each at a different *Rediscovery Fraction*.
- There are four flows involved in code completion. These are:
 - Rookie Code Completed
 - Experienced Code Completed
 - Rookie Code with Errors
 - Experienced Code with Errors
- The Total Daily Code Completed is a capacity constrained flow based on (1) the Code Remaining stock and (2) the total code capacity in the system.
- The Total Daily Code Completed is allocated between Rookies and Experienced based on their *contribution to the overall capacity*. For example, if Rookies account for 20% of the total capacity, then Rookies will code 20% of the Total Daily Code Completed. This allows the modelling of the Rookie and Experienced code flows, for example, *Rookie Code Completed* and *Rookie Code with Errors*.
- There are two flows (fractional decrease rates) that are used to model the discovery of undiscovered rework:
 - Rediscovered Experienced Code
 - Rediscovered Rookie Code.

The stocks and constant values are defined as:

(1) Summary of Stocks and Initial Values – Aging Chain Section of Model

Stock	Initial Value
Rookies Stage 1	20
Rookies Stage 2	0
Experienced	0

(2) Summary of Stocks and Initial Values – Code Completion/Rework Section of Model

Stock	Initial Value
Code Remaining	100,000
Code Completed Rookies	0
Code Completed Experienced	0
Undiscovered Rework Rookies	0
Undiscovered Rework Experienced	0

(3) Summary of Model Constants

Variable	Role	Value
Promotion Delay	The average time for a Rookie to gain promotion	75 (Days)
Activate Promotion	A control flag that acts to activate (1) or deactivate (0) promotions from Rookie to Experienced.	0 or 1
Rookie Productivity	The average productivity for a Rookie	50 lines of code/person/day
Experienced Productivity	The average productivity for an Experienced person	100 lines of code/person/day
Rookie Yield	The average yield for a Rookie	0.60
Experienced Yield	The average yield for an Experienced person	0.90
Rookie Rediscovery Fraction	The fraction of undiscovered rework detected by a Rookie	0.05
Experienced Rediscovery Fraction	The fraction of undiscovered rework detected by an Experienced person	0.25

(4) Summary of Other Model Variables (No equations provided here)

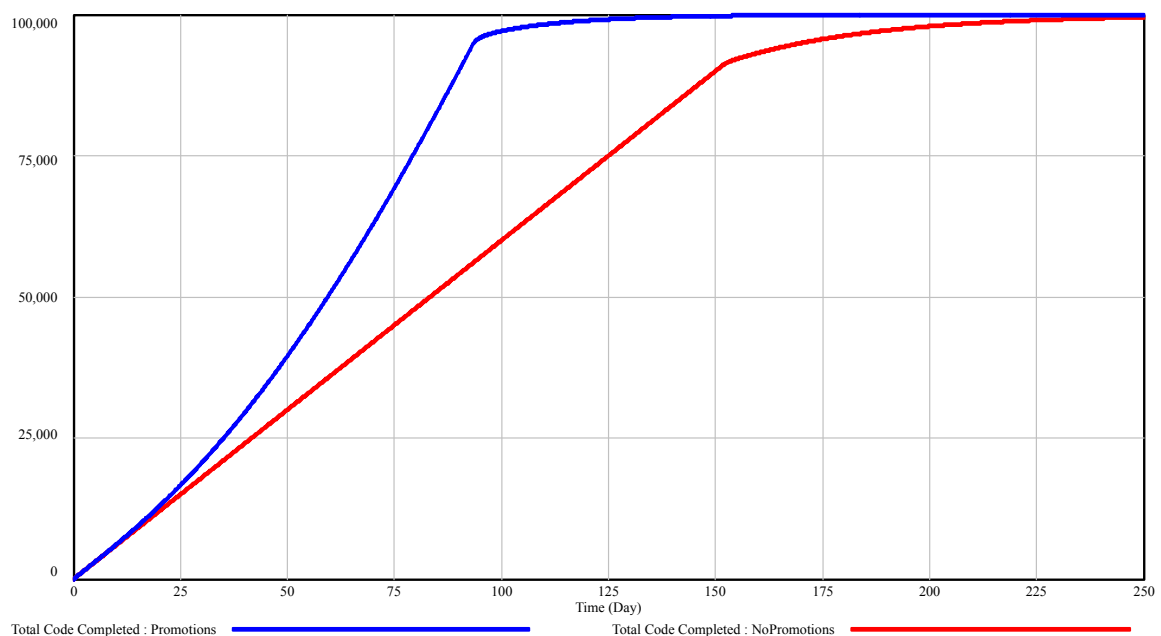
- Rookie Capacity
- Experienced Capacity
- Total Capacity
- Rookie Capacity Share
- Experienced Capacity Share
- Total Daily Code Completed
- Total Rookie Daily Code Completed
- Total Experienced Daily Code Completed

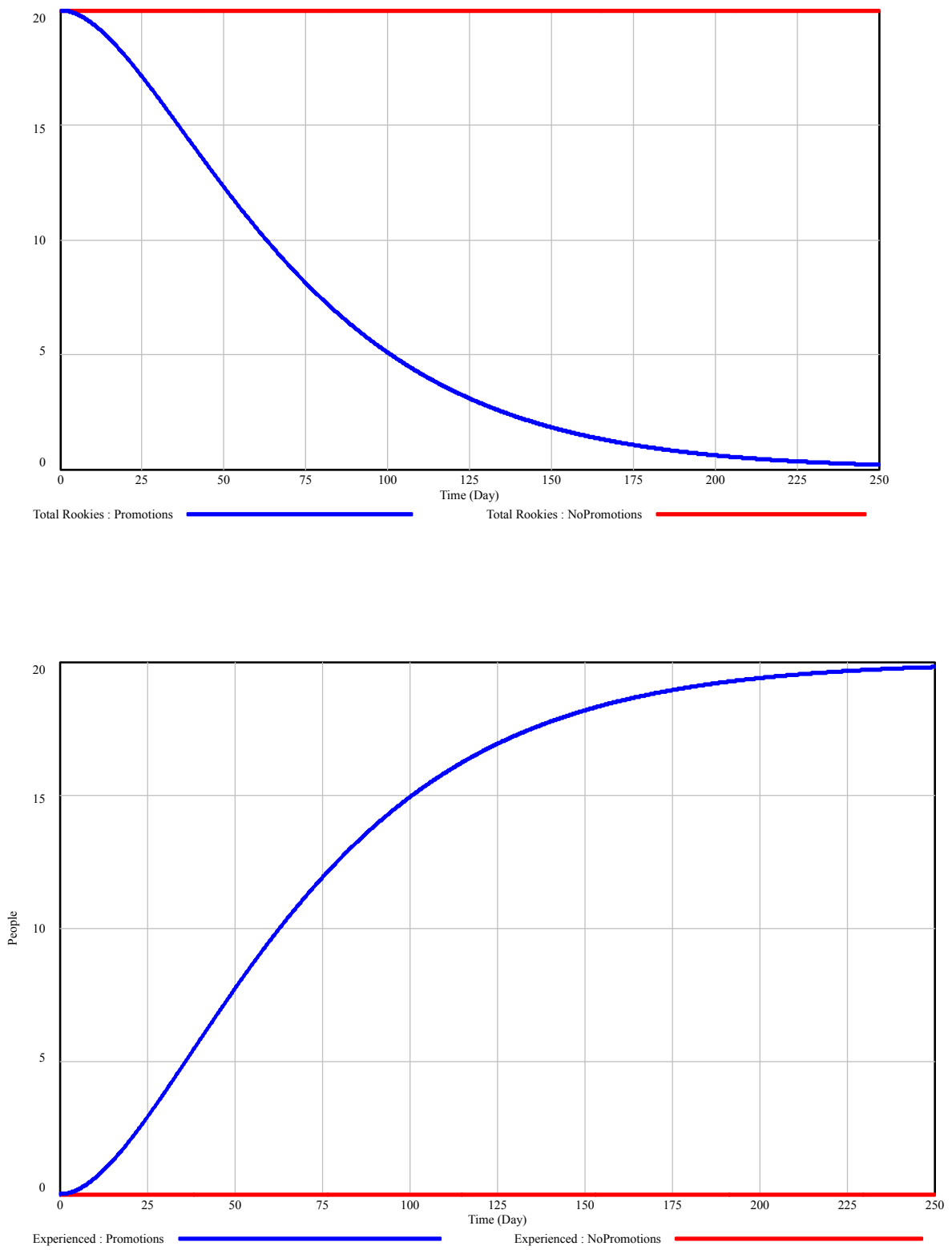
Scenarios

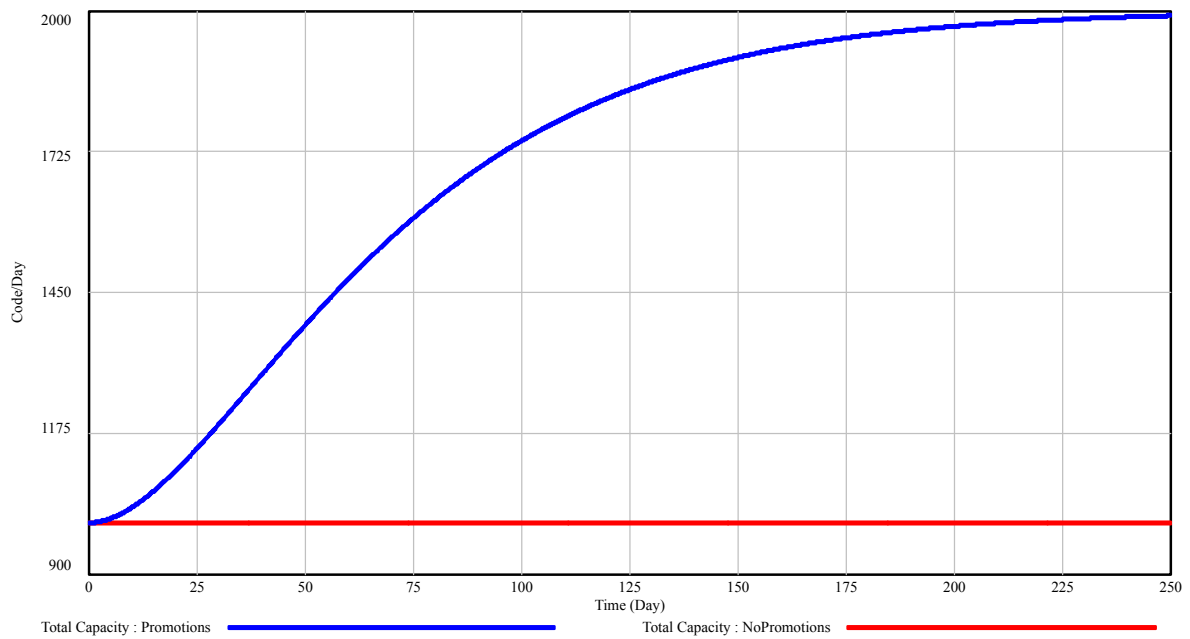
There are two scenarios:

- (1) Run the model with the ageing chain active
- (2) Run the mode with the ageing chain inactive.

The following results should be generated (make sure to show the two scenarios in each plot, and use the “Control Panel” to generate the graphs.







Overall Tasks:

- (1) Build the model, and submit as an MDL File, with unit checking (this will be covered in future lectures)
- (2) Add the plots to a PDF file, and explain what is driving the different outcomes for each scenario.
- (3) Discuss how you might extend the model to make it more useful.