**ABM – Week 4 – Seminar – LVL3**

**Purpose**

This task will allow you to code simple interactions between turtles and patches. It will also prepare you for Coursework 2, in which you will use a similar model.

**Model**

Open the model tutorial\_4\_starting\_model.nlogo. This model provides a basic framework as a starting point for this task.

**Task**

Create a model where…

* Patches contain food that turtles can eat, with each patch having a maximum amount of food that it can contain (between 0 and 100). Food starts at its maximum value and grows back at a rate of 1 unit per tick if it is depleted.
* Each turtle (initial population 100) has an energy level (initially 100), which reduces by a fixed amount (between 2 and 10, varying between turtles) at every tick. Turtles can consume the food on their patch at a rate of 5 units per tick to replenish their energy. Turtles with zero energy will die.
* If a neighbouring patch contains more food than their current patch, turtles move to the patch with more available food.

Create graphs to monitor how key quantities change as the simulation runs.

**Extensions**

1. There are several fixed values in the model (e.g. turtles can eat a maximum of 5 units of food per tick; food grows back at a rate of 1 unit per tick; etc.). Replace some of these fixed values with variables and create sliders in the Interface for these variables. Investigate how the behaviour of the model changes as these variables are changed.
2. Rather than distribute food randomly, create “hills” of food, like the geography used in the butterflying hilltopping model. How does this affect the behaviour of the model?
3. Allow turtles to give birth to offspring if their energy level is sufficiently high. Perhaps these offspring will have the same energy usage as their parent, or perhaps it will be randomised. How does this affect the behaviour of the model?