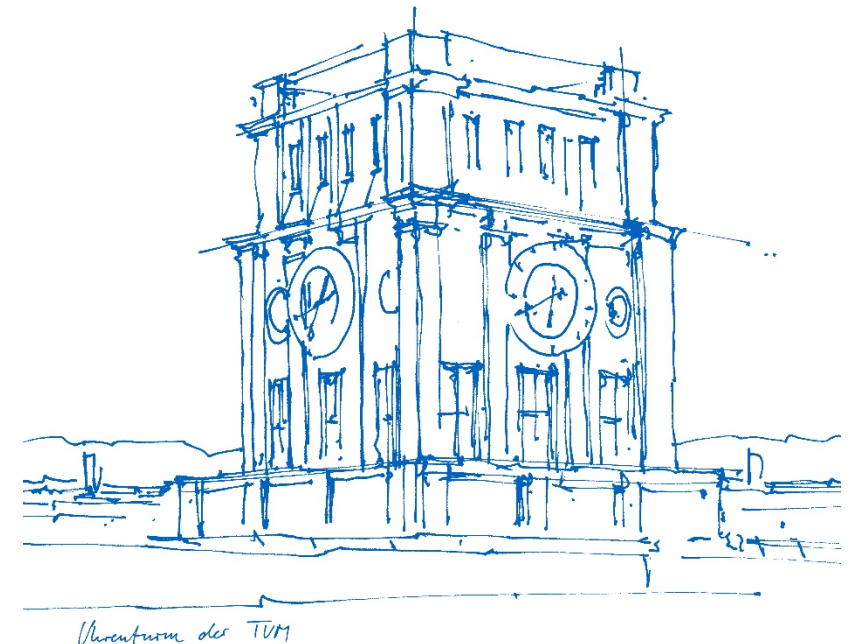# Simulation – Übung II

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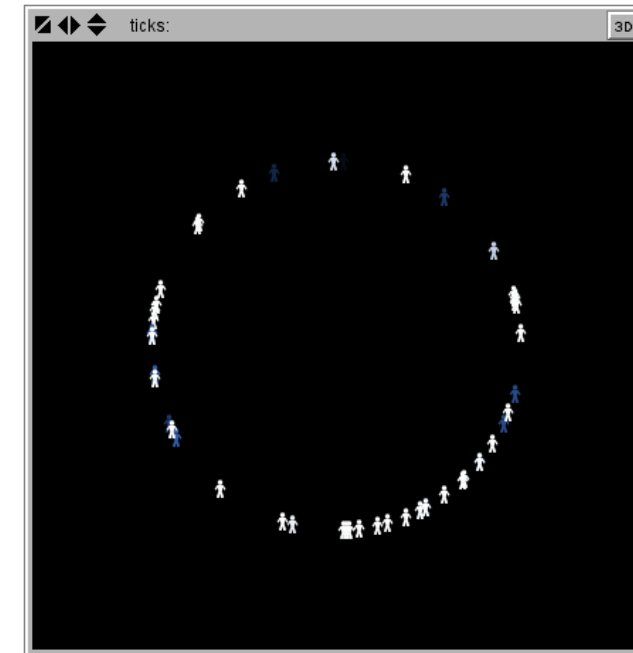
Uhrenturm der TUM

Humans and Variables

```
turtles-own [energy]

to setup
 crt 50 [fd 5
    set shape "person"
    set energy random 50
    farbe
  ]
…
end

to go
   set energy energy - 0.1
   farbe
   if (energy < 0) [die]
   fd 1
end

to farbe
   set color scale-color green energy 0 50
end
```

Diffusion

```
to setup
  ca
  crt 50 [set color blue]
  crt 5 [set color red]
  ask turtles [fd 5 rt random 30 fd 5]
end

to go
  rt random 30
  lt random 30
  fd 1
  if any? turtles-here with [color = red] [set color red]
end
```

Ticks

Ticks have two purposes:
   a)   Synchronize activities, i.e. turtles wait when they are done with their jobs for next tick
   b)   Discrete time that can be used for plots, i.e. t1, t2, t3, …

reset-ticks - resets the tick counter to zero (global setup)

```
to setup
  ca
  crt 100
  reset-ticks
end
```

tick - advances the tick counter by one and updates all plots

```
to goGlobal
  ask turtles [goTurtles]
  tick
end

Plot:
```

Plot

Counts turtles with specific characteristics

Needs „tick" mode

plot count turtles with [color = red]
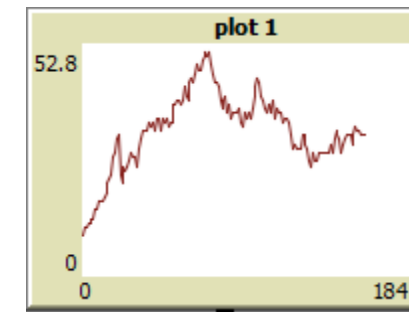
Change Patch

Procedure:

```
to checkPatch

    ask turtles[

    if pcolor = red [set pcolor black]

    if pcolor = blue [set pcolor red]

    ]
End
```
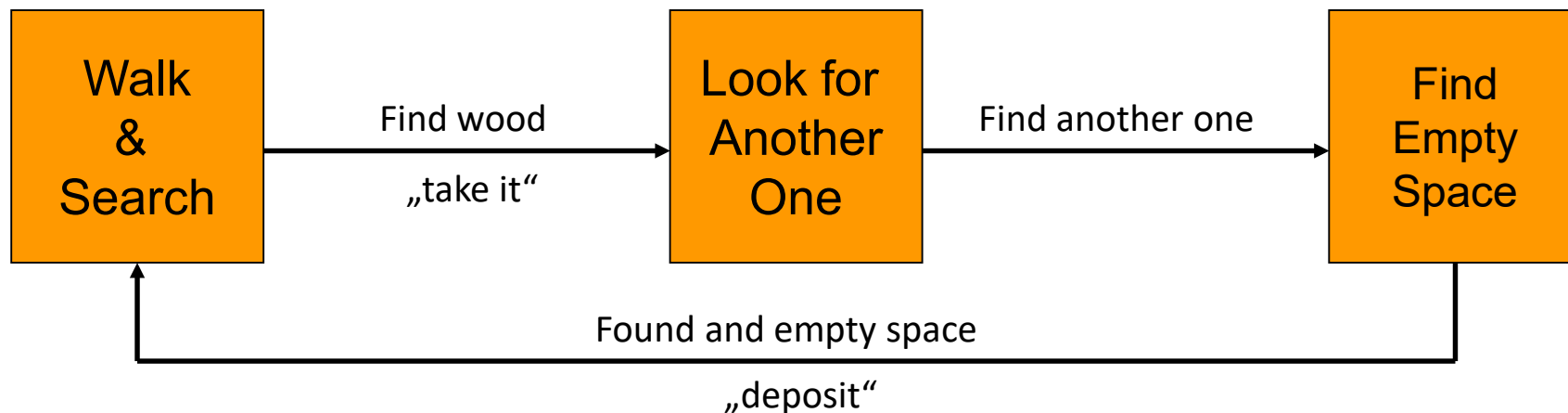
→ `checkPatch` as part of goGlobal

Project: Termites

Termites have rules:

- Walk around
- If you find a piece of wood: take it
- If you find another piece of wood: put the first one nearby

Fyi: Real termites are a little bit smarter

```
┌──────────┐   Find wood      ┌──────────┐  Find another one  ┌──────────┐
│  Walk    │   „take it"      │ Look for │                    │  Find    │
│   &      │ ───────────────► │ Another  │ ─────────────────► │  Empty   │
│ Search   │                  │   One    │                    │  Space   │
└──────────┘                  └──────────┘                    └──────────┘
     ▲                                                              │
     │              Found and empty space                          │
     └──────────────────────────────────────────────────────────────┘
                        „deposit"
```

Procedures

<u>Observer Procedure:</u>

```
to setup
 ca
  ask patches [if (random 100) < 20
     [set pcolor yellow]
  ]
  crt 50 [
     rt random 360
     jump random 200
     set color red
     set shape "bug"
  ]
End
```
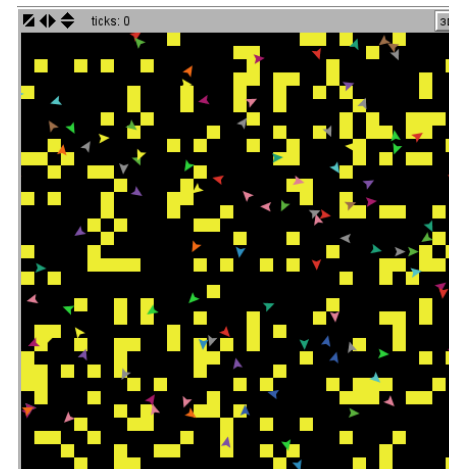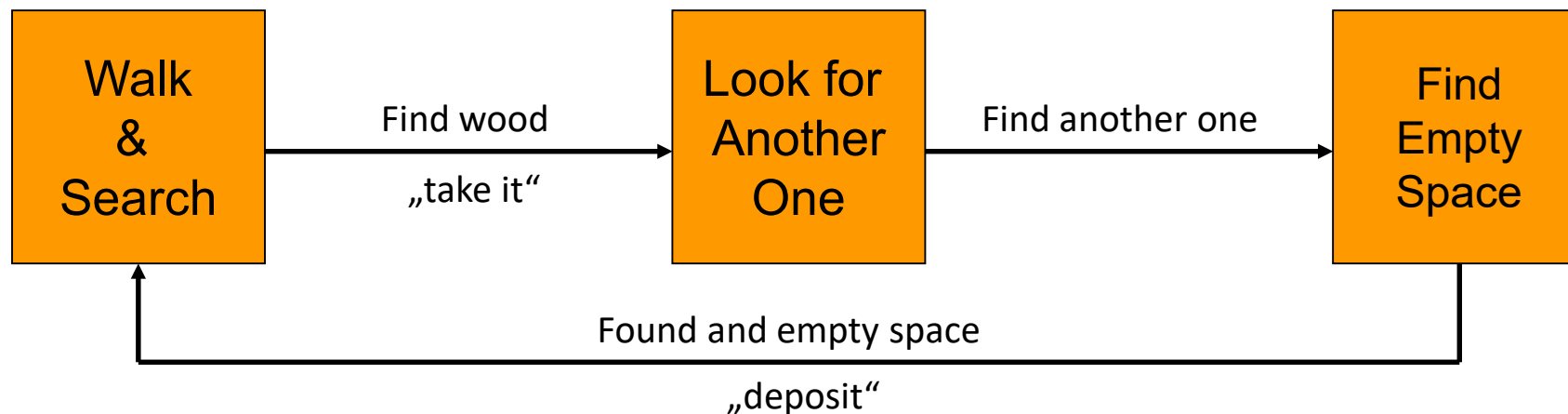
Procedures

Turtle Procedure:

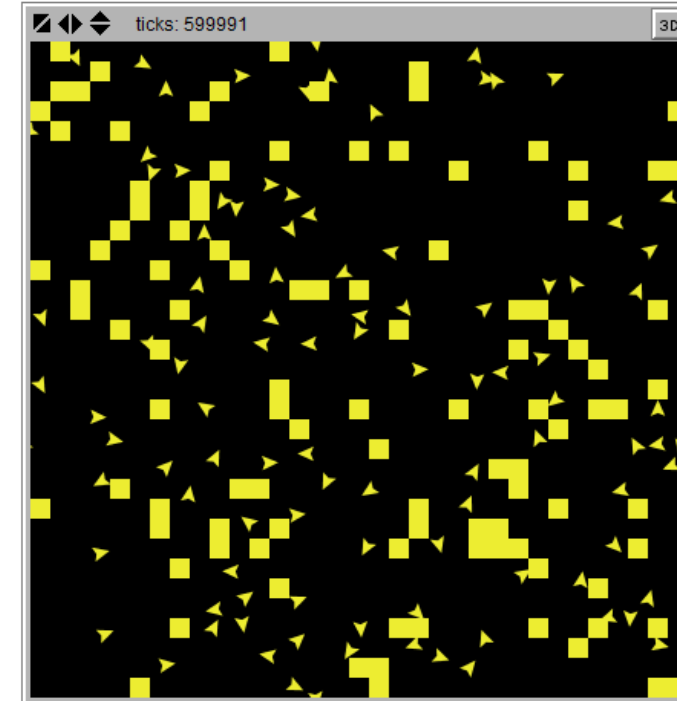```
to goTurtles
  wiggleAndGo
  ;if (color = red) [Search]
  ;if (color = yellow) [LookForAnotherYelloPatch]
  ;if (color = orange) [FindEmptySpace]
end
```



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# Walk And Search

```
to wiggleAndGo
  rt random 30
  lt random 30
  fd 1
end

to Search
  if [pcolor] of patch-here = yellow [
    ask patch-here [set pcolor black]
    set color yellow
    jump 5]
end
```
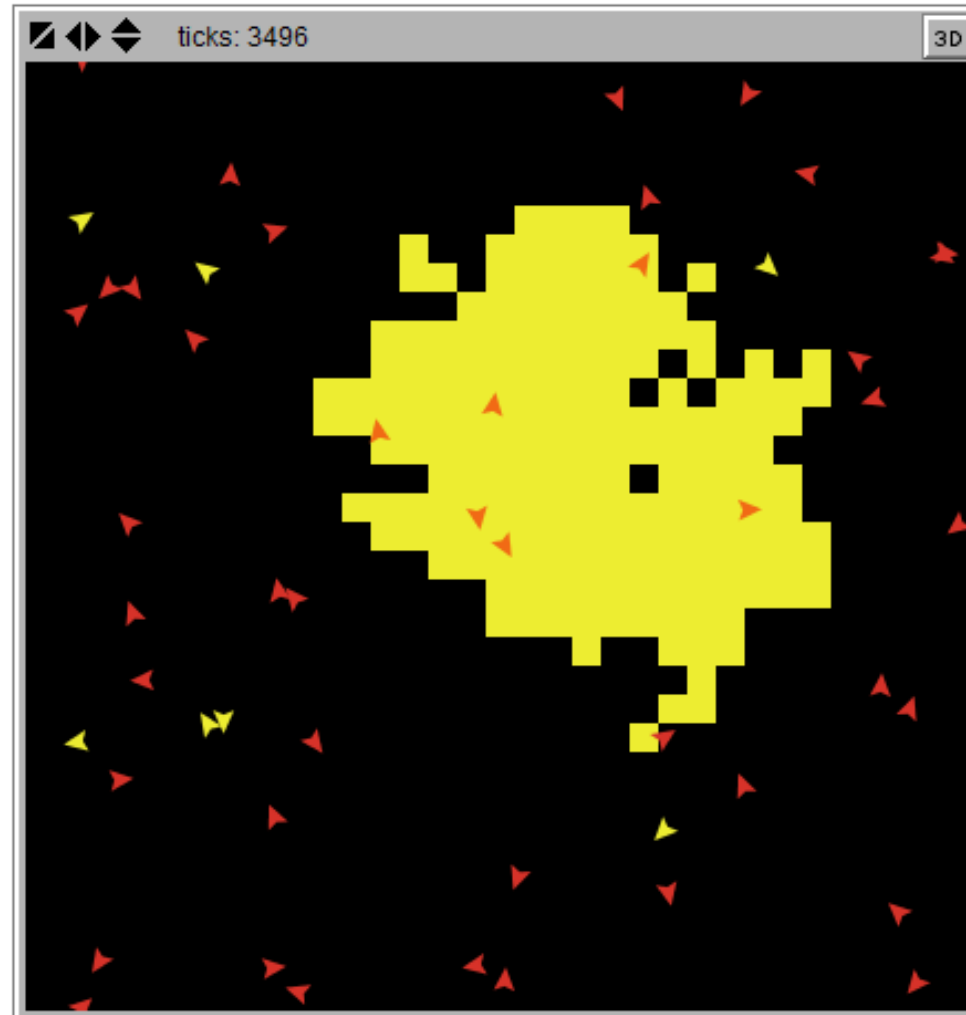
# Other Procedures

```
to LookForAnotherYelloPatch
  if [pcolor] of patch-here = yellow [
    set color orange]
End

to FindEmptySpace
  if [pcolor] of patch-here = black [
    ask patch-here [set pcolor yellow]
    set color red
    jump 5]
end
```
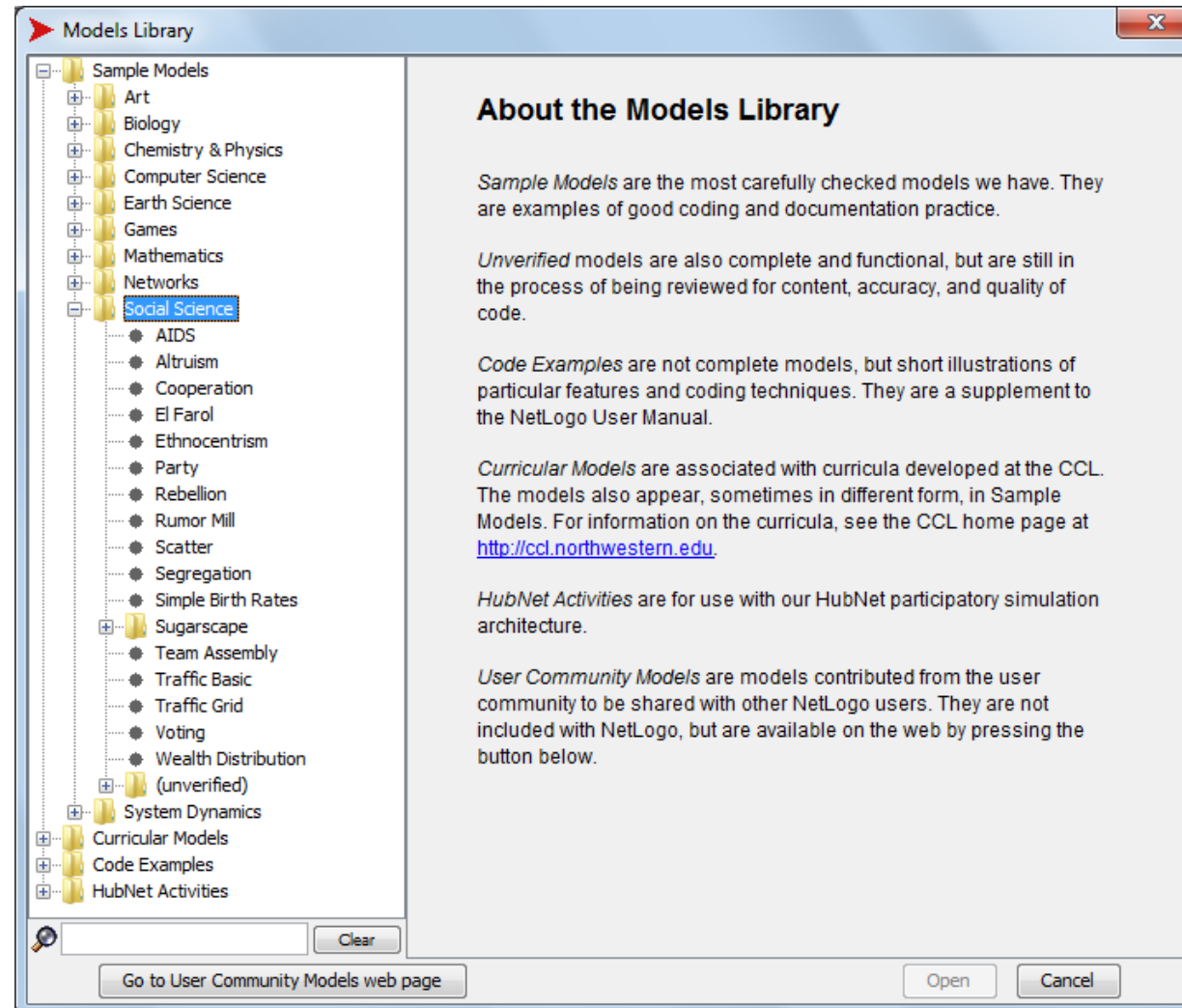
# Result

# Large Model Library

# Social Interaction

```
turtles-here
```
(agent set containing all the turtles on the caller's patch)

```
count turtles-here
```
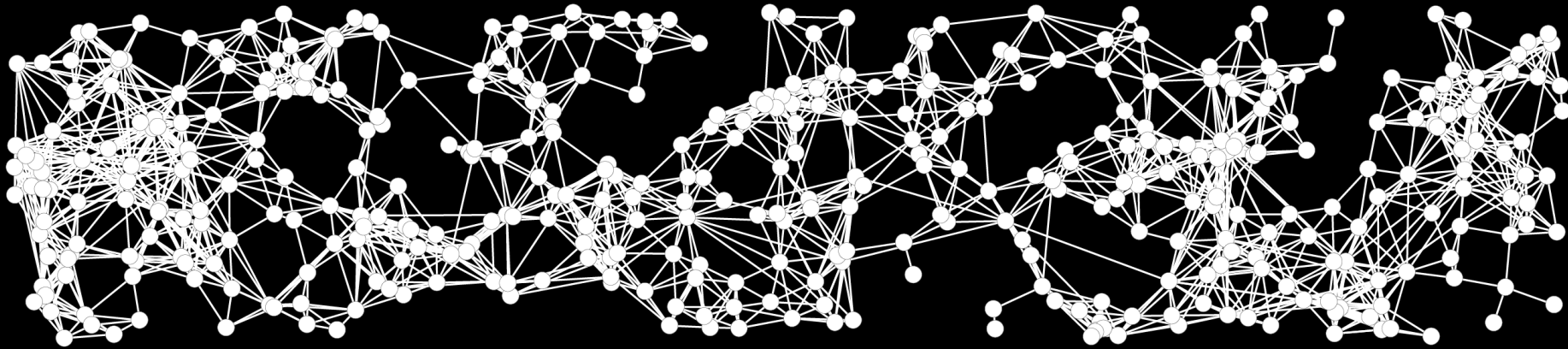(number of turtles on same patch)

```
one-of turtles-here
```
(returns the who number of one other turtle on same patch; -1 if no other turtle)

```
if any? turtles-here with [color = red]
```
(reports true if the given agentset is non-empty)

*"Our mission is to go forward, and it has only just begun.
There's still much to do, still so much to learn. Engage!"*
Jean-Luc Picard, Star Trek TNG, Season 1 Episode 26



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