# Urban Growth:Simulating Settlement Patterns

**Adventures in Supercomputing Challenge**

**Final Report**

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**Team #018**

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# Urban Growth:Simulating Settlement Patterns

# Project Statement

***Our goal this year was to model settlement patterns through the use of the program Star Logo.***

## Executive Summary

***In our project we had planed to simulate the patterns of people settling into villages, towns, or cities and then measuring the distribution of settlement sizes (how many cities there are of a certain size)Then create a slightly more complicated simulation in which the agents were biased to stop at a square that was already inhabited. This we tried to model in StarLogo. Our results were different that what we had expected due to time constraints and program difficulties.***

### Our Method

***This has been an enriching and difficult experience for the members of team eighteen, all of whom have never before participated in the New Mexico Supercomputing Challenge and have never programed in StarLogo. We have been working incredibly hard for the past few months, learning how to program, doing our best to find information, contact mentors and meet deadlines. In the beginning we came to the conclusion that working together in all aspects of the program would give us better results. It has been difficult, to say the least, but none the less, a worthwhile experience. We have learned a significant amount about settlement patterns and modeling in StarLogo as well. We started out this***

*process by looking at a general idea: simulating settlement patterns. Many articles have been written about settlement patterns in both modern day and ancient. From these articles, we began gathering information as to different settlement patterns and what attracted people to live in those certain areas. By the time of Interim, we had created a program, and then tried to make it more complex, in doing this we altered the code so that did not run. After many experiments we figured everything out and got a simple version of our program to run.*

## Our Results

*Due to the fact that we have not been able to complete our program, our results have not so much had to do with our actual project in general. We have discovered, however, that through the process of many different agents searching for a home all at once, you get several large cities and less small ones.*

## Our Conclusion

*Due to the fact that we have not been able to complete our program, our results have been fairly simple. Because we were unable to finish our*

***program, as we stated before, the conclusions we have made are only based on our results so far. We have discovered that when 150 agents all have the same purpose- to find a home, they will form several large cities, and fewer small ones.***

## Our Code

**Our code is very simple right now. Basically all it does right now is the agents move around randomly and settle when they run into another agent. When we run it, we get one or to large cities and lots of small ones. We eventually hope to make our code more complex by adding in the details we listed earlier.**

## Our Achievements

*We believe our biggest achievement is that we have gotten this far successfully. At the beginning of the year, our team was unable to program at all, and were having troubles in many other aspects as well. Because of this, we were forced to change our project completely, thus putting us farther from our goal of completing the project on time.*

*Although we still are not experts when it comes to programming in StarLogo, we feel that we have learned a good amount. By participating in supercomputing, our skills in giving oral presentations have improved and we are able to perform tasks using a computer with much more success. We hope, now, to educate others on this topic and be able to expand our own horizons as well. We also overcame some issues involving group dynamics.*

## Acknowledgments

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*Melanie Moses- Mentor*
*Ryan Gerety- Program Specialist*
*Stephanie Forrest-Program Specialist*
*Greg Scantlen- Ass. Supercomputing Advisor*

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## Appendix 1-Code

```
to setup
ca
crt 150
repeat 75 [ask-turtles [wiggle]]
end

to wiggle
fd 1
rt random 50
lt random 50
end

to gallop
wiggle
if (count-turtles-at 1 1) > 0 or
 (count-turtles-at 1 -1) > 0 or
 (count-turtles-at -1 -1) > 0 or
 (count-turtles-at -1 1) > 0 or
 (count-turtles-at -1 0) > 0 or
 (count-turtles-at 0 -1) > 0 or
 (count-turtles-at 1 0) > 0 or
 (count-turtles-at 0 1) > 0 [
stamp color
```

```
stop
]
gallop
end
```