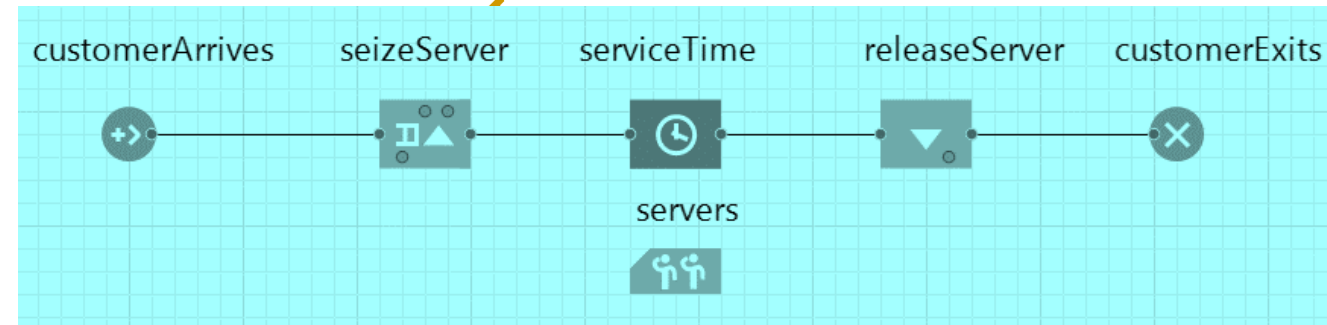
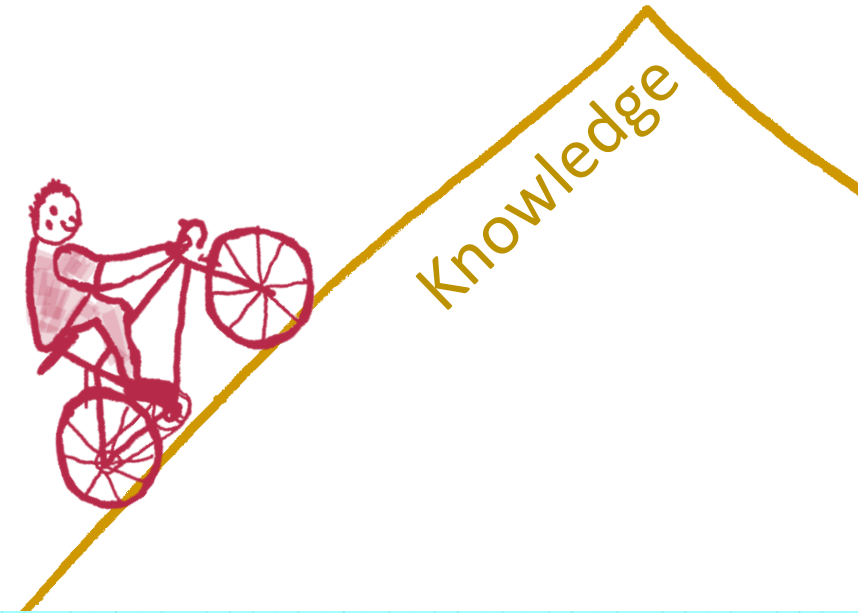


# A different perspective: Using simulation modeling to find the way to knowledge

Dr Eugen Rodel

WIAD 2023, 4<sup>th</sup> March 2023, Zürich



How can simulation modeling help us to  
**translate data into**  
**information and knowledge,**  
to support the right action along the way?

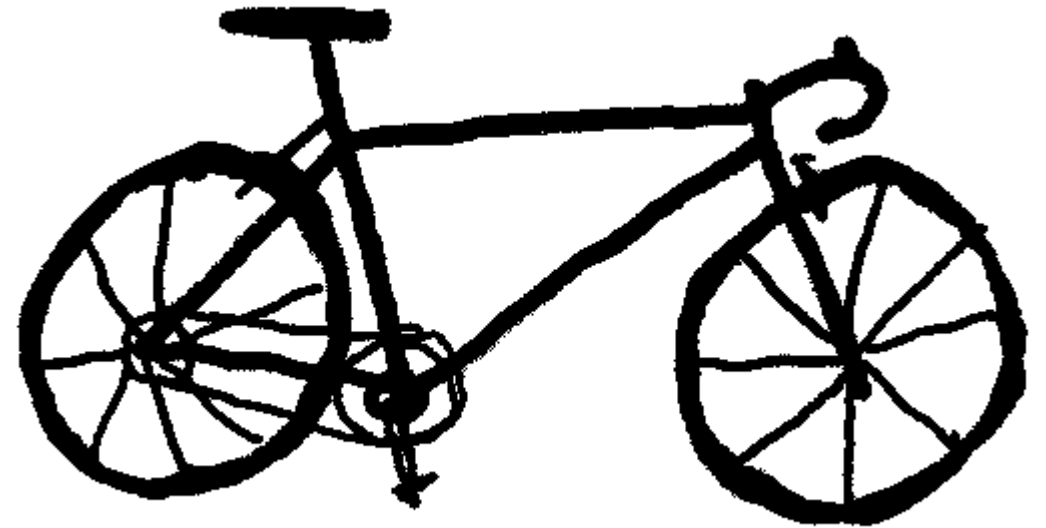
# Basics | Simulation Modeling | DIKW Architecture

# Basics | Simulation Modeling | DIKW Architecture

# Bicycle

Just a symbol?

# Bicycle

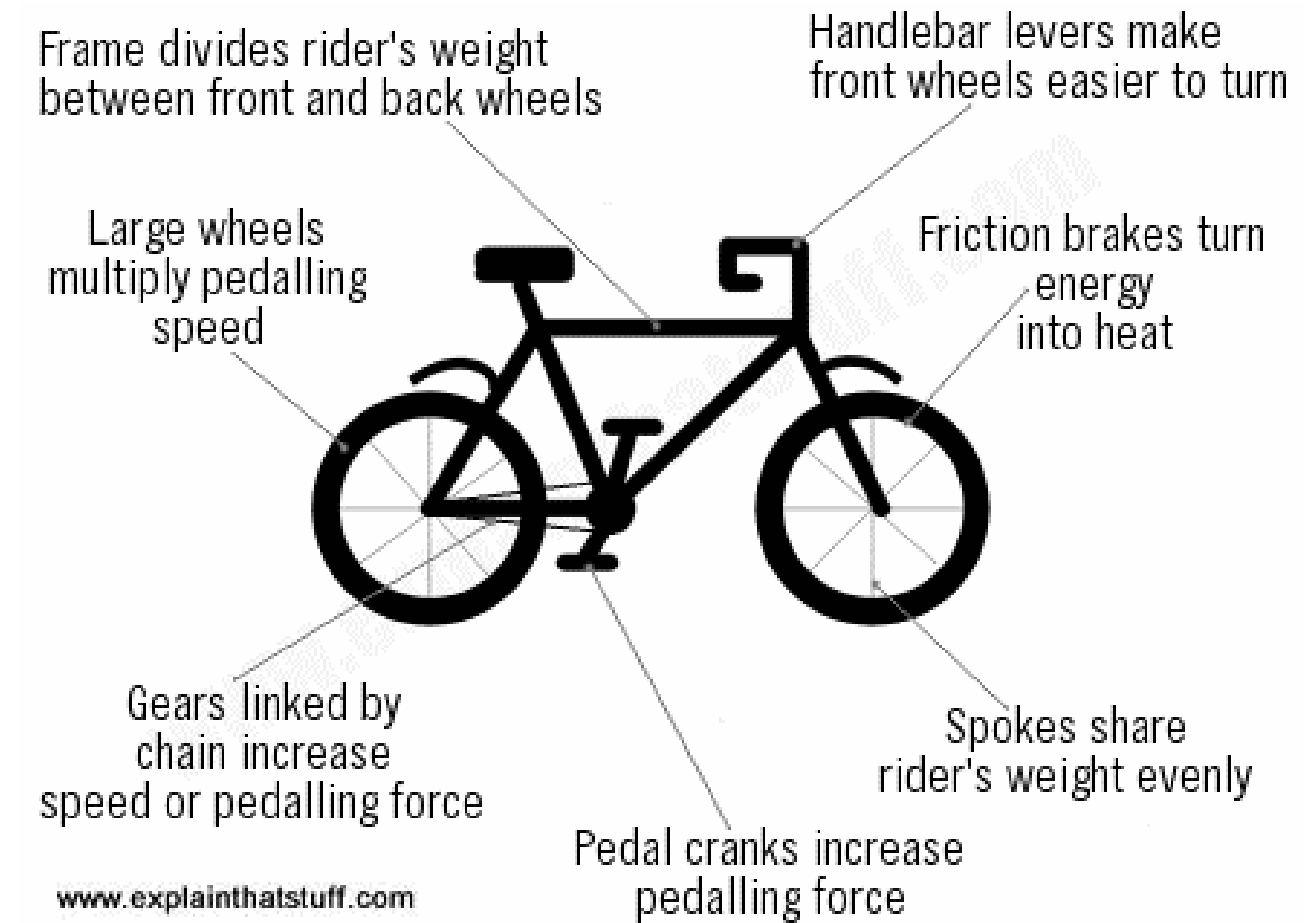


Data are patterns with no meaning. Information is interpreted data.

**How does  
this thing work?**

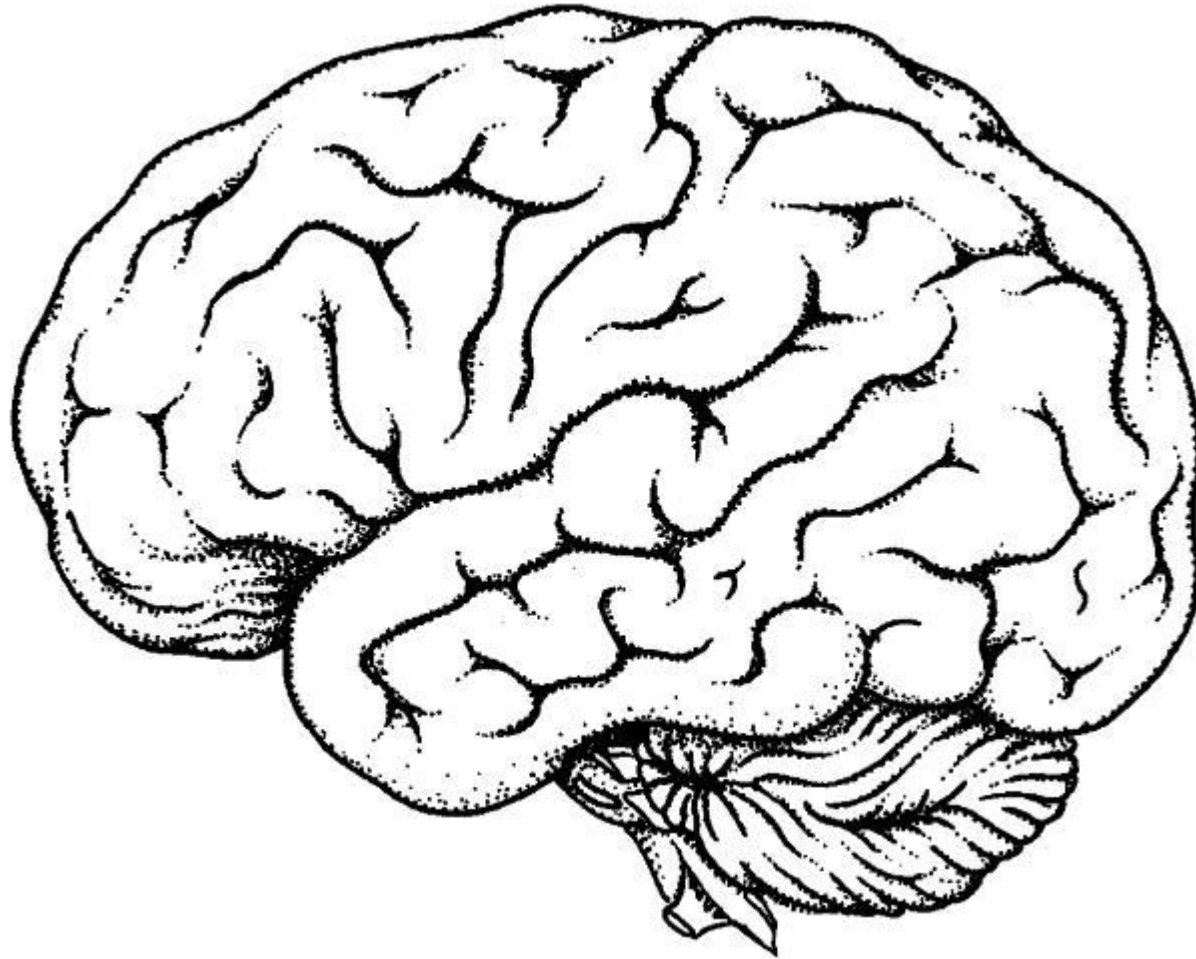
I need to examine the subject and find a logical answer.

# How does this thing work?



Models represent how something works.  
Knowledge is learned information.

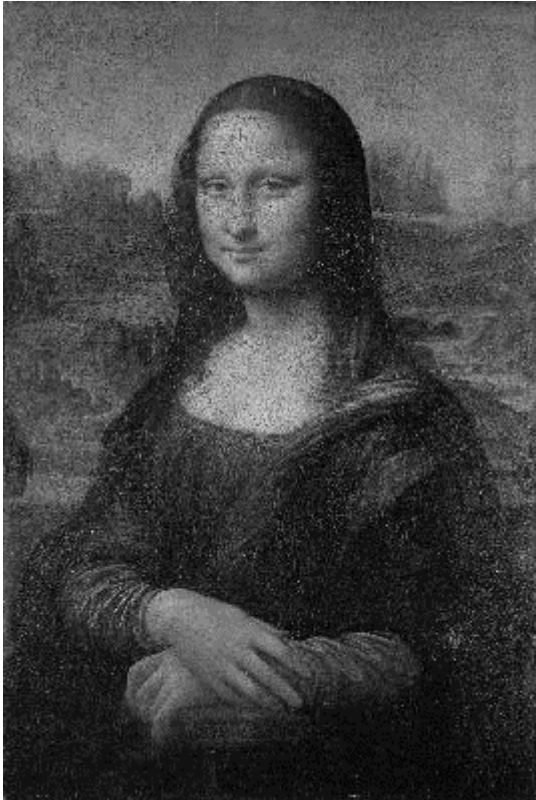




Our brain understands how something works and interacts with it to anticipate how that object will behave in a variety of scenarios.

<http://getdrawings.com/images/brain-cartoon-drawing-18.jpg>

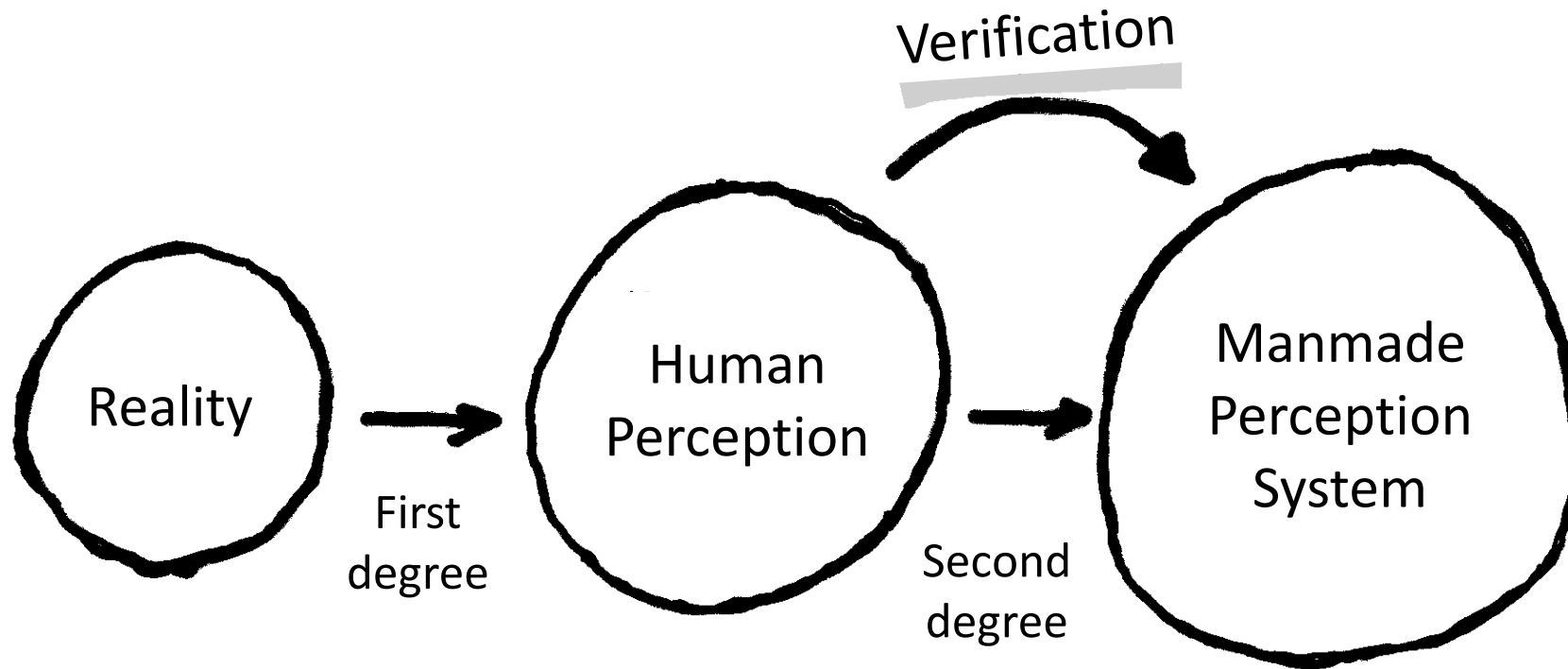
Our brain, or “model engine”, continually develops, remembers, and execute mental models.



The objective reality that surrounds us is much more complex than our neural networks (our brains) can effectively process.

<https://www.artnews.com/wp-content/uploads/2019/10/1449px-monalisabyleonardodavincifromc2rmfretouched.jpg>

Abstraction is the process of converting some reality into a representation of one.

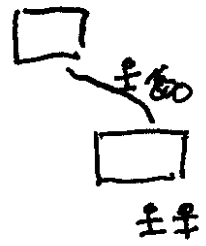
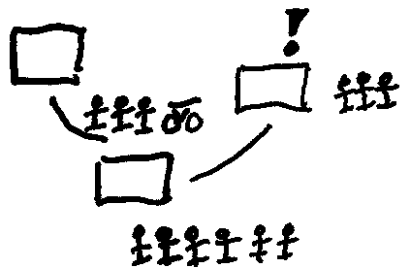


From the outside world into our biological perceptual system to a manmade perceptual system.

Models can help the brain focus its limited powers to decipher the complexity of a particular problem.

# Basics | **Simulation Modeling** | DIKW Architecture

World of models

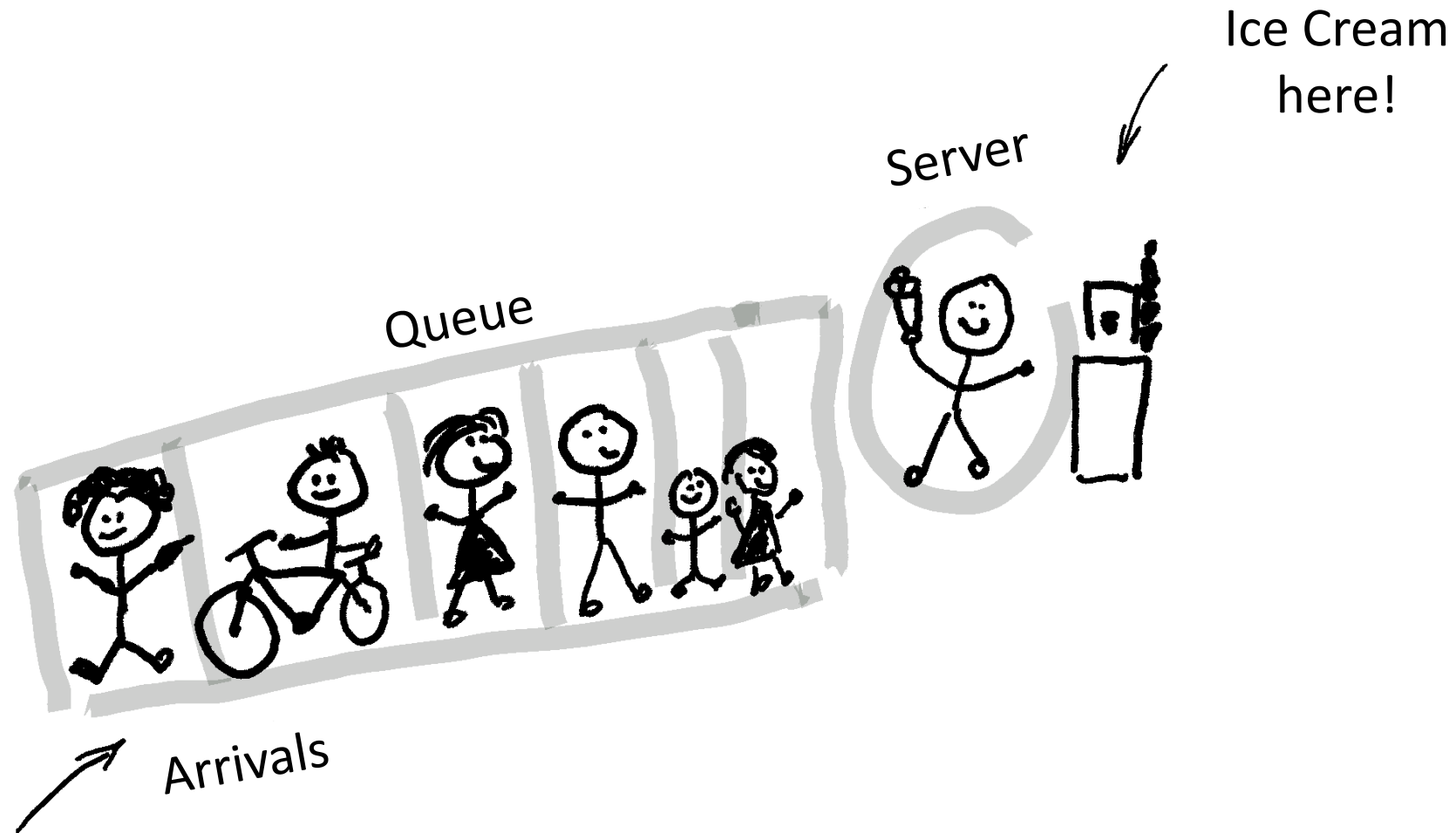


Real world



Modelling means reducing the complexity of the original system and solving problems that occur in the real world.

We build a model of a real system:  
its representation in a modeling language.

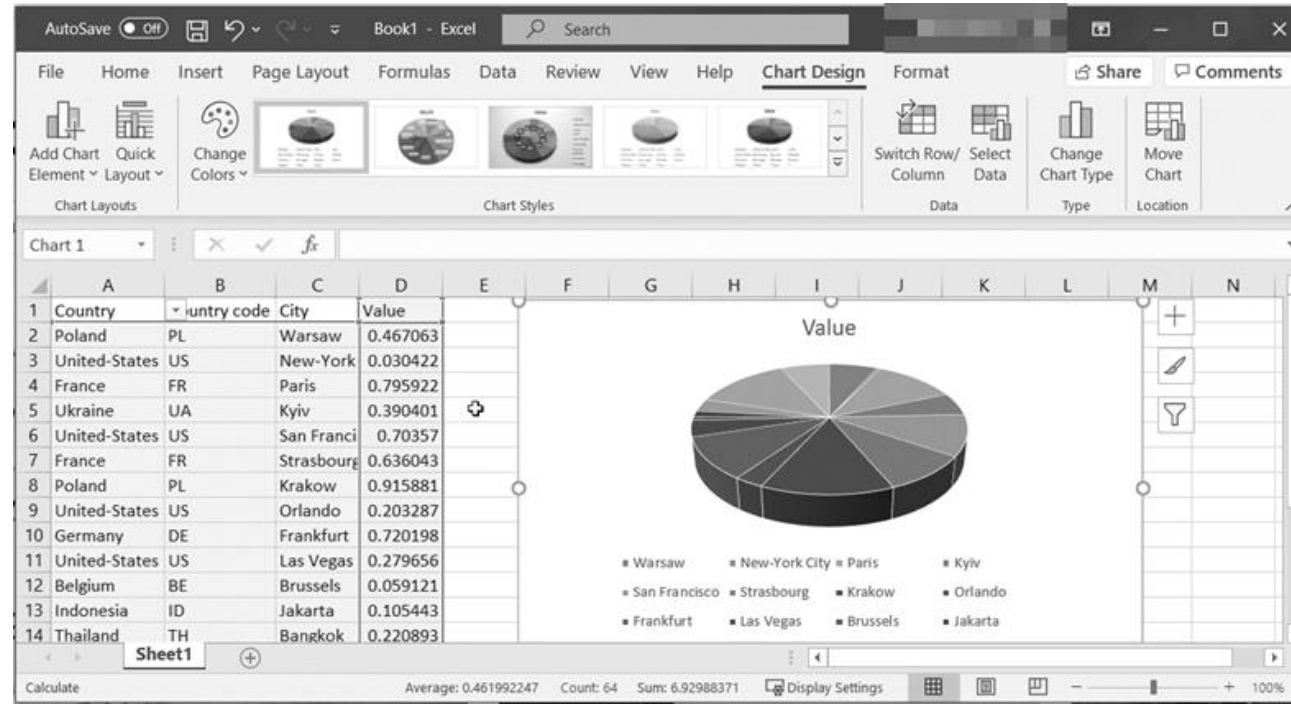


The whole modeling thing is about finding the way from the problem to its solution.

# Calculate!

Inputs

$X_1$   
 $X_2$   
 $X_3$   
...



Outputs

$Y_1$   
 $Y_2$   
 $Y_3$   
...

$$y = f(x)$$

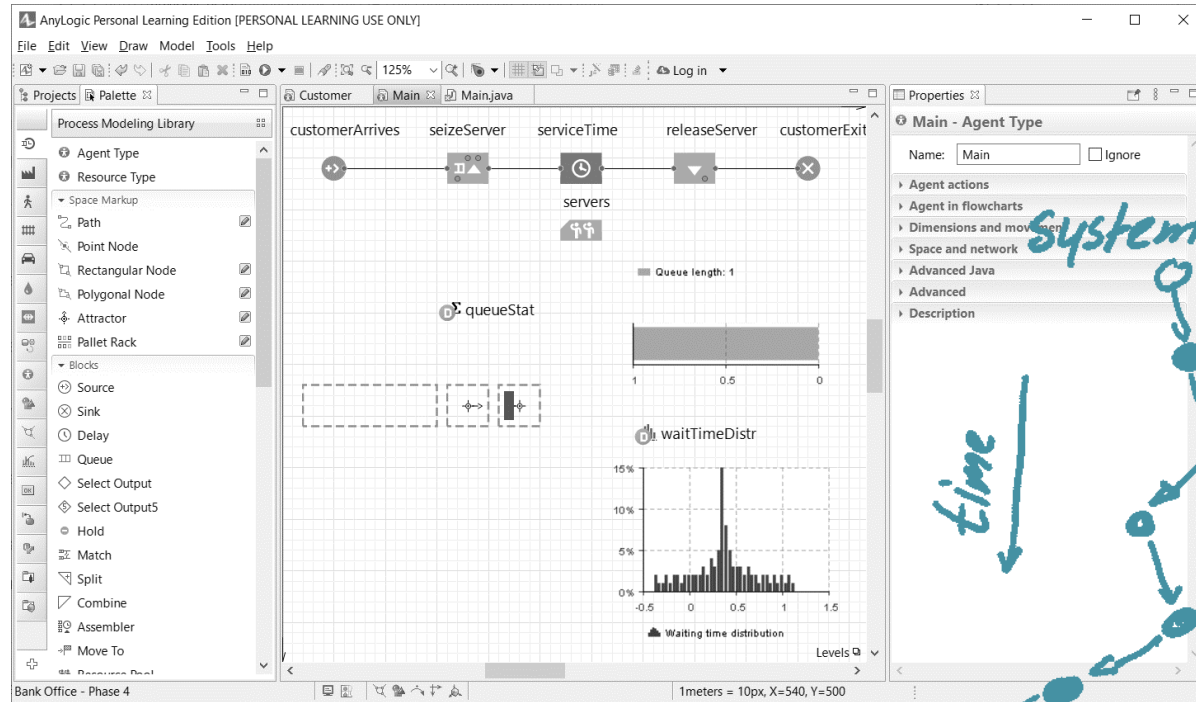
<https://www.ybierling.com/images/original/officeproductivity/ms-excel-productivity-tip/ms-excel-productivity-tip.png>

Some problems are very hard to approach with a spreadsheet.

# Run!

Inputs

$X_1$   
 $X_2$   
 $X_3$   
...



Outputs

$Y_1$   
 $Y_2$   
 $Y_3$   
...

rules: current → next state

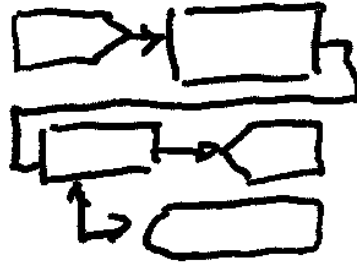
Models enable you to analyze systems and find solutions where other methods fail.



System Dynamics



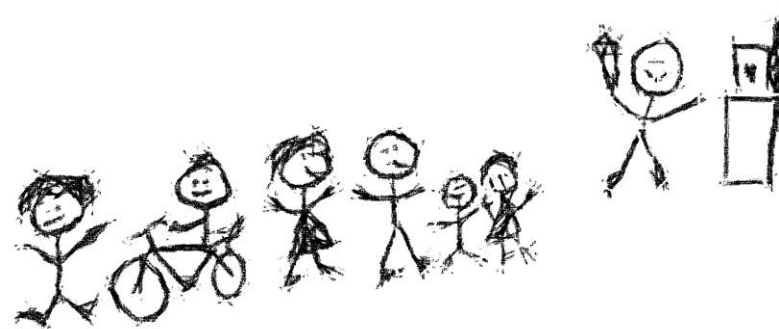
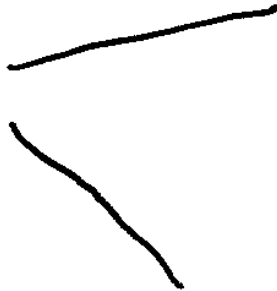
Discrete Event Modeling



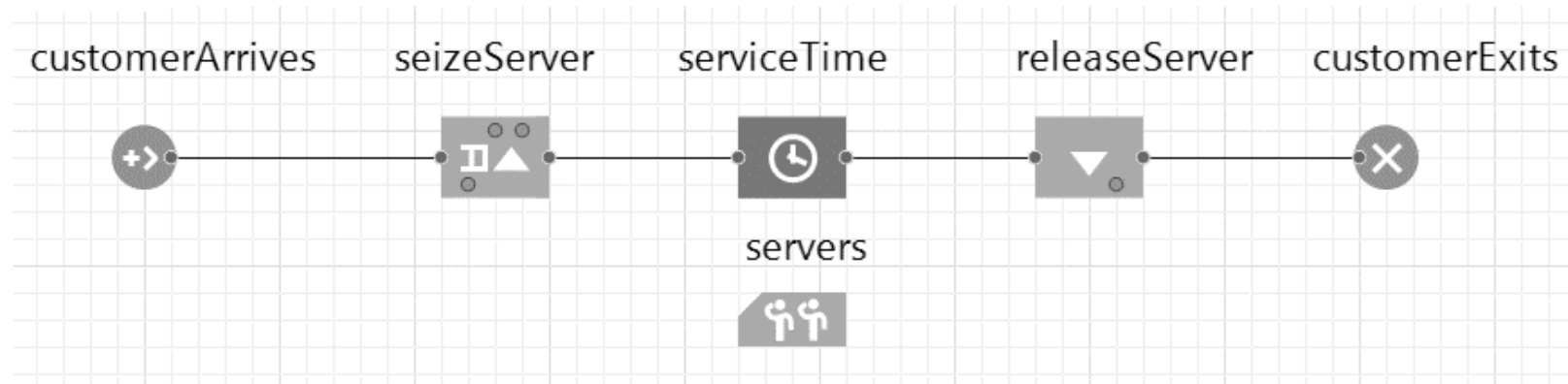
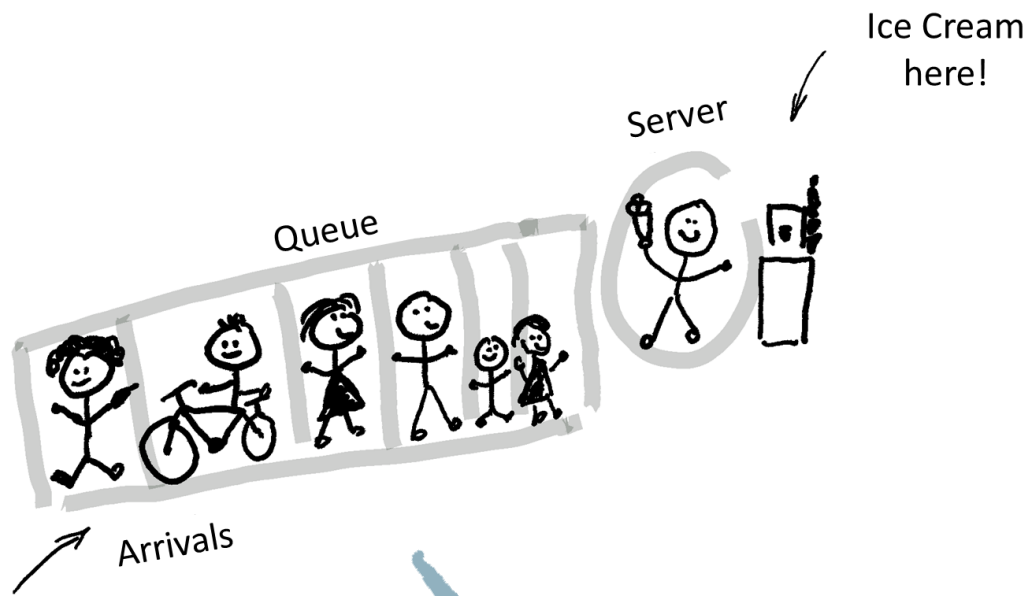
Agent-Based Modeling



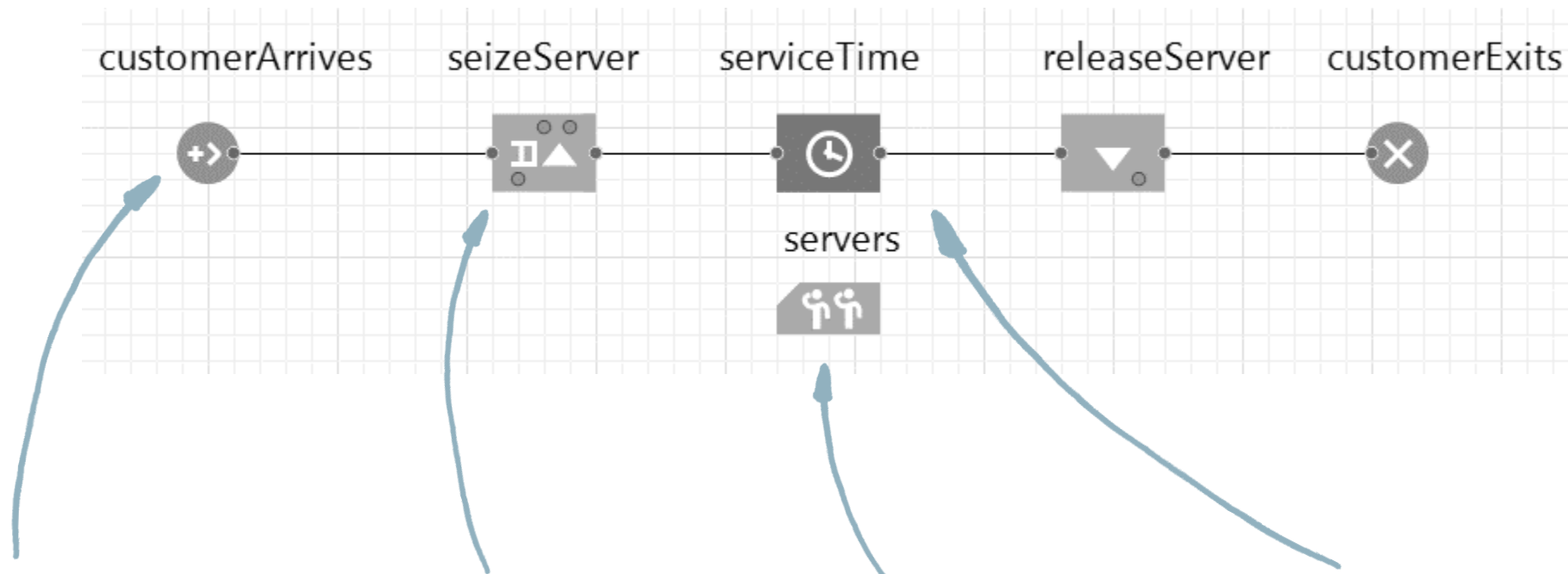
The modeler



Modeling is the realm of art, experience and intuition,  
not science and technology.



The work is a bit like playing with LEGO!  
 First, we build it and then we can play with it.



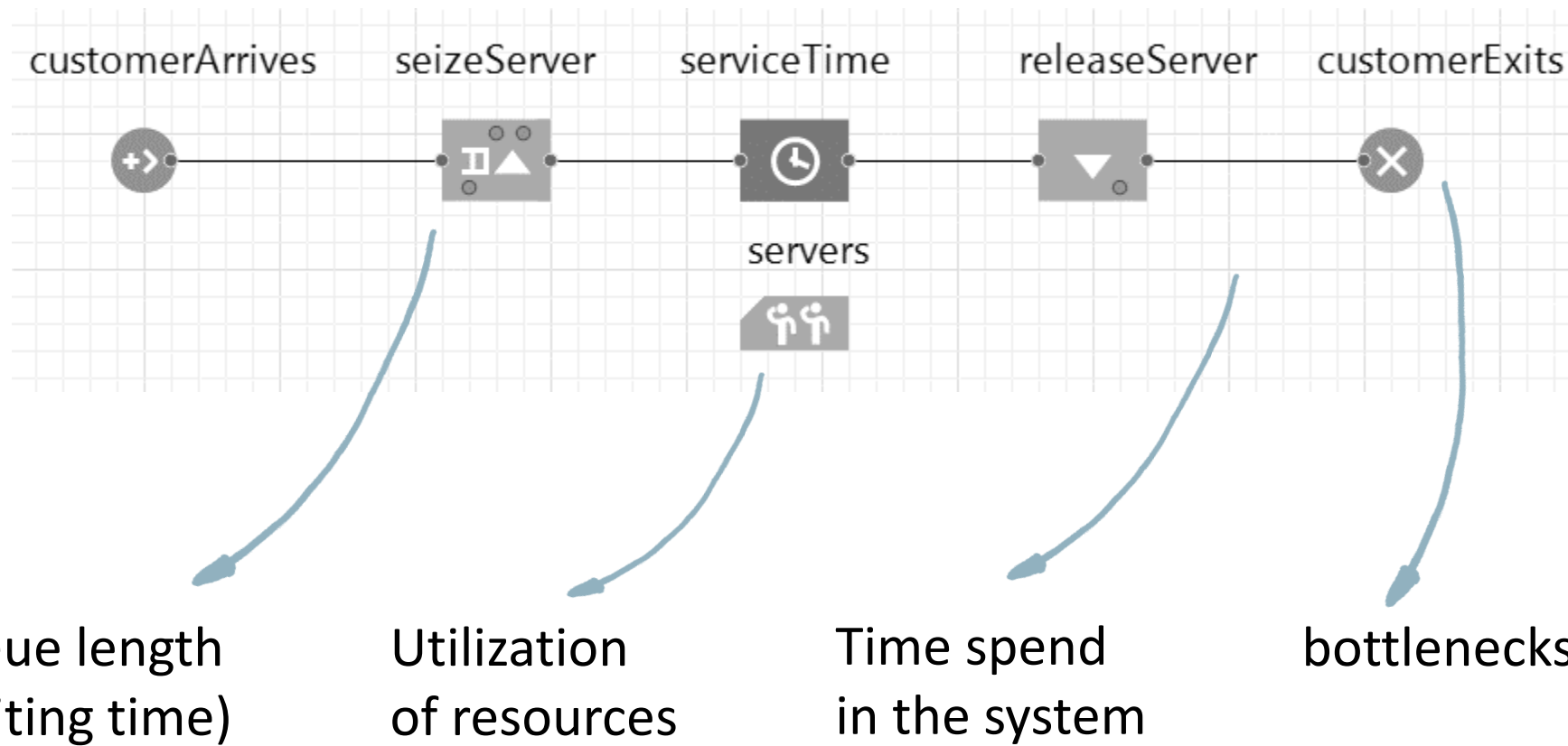
At what time do the ice cream lovers arrive?

Is there a maximum queue length?

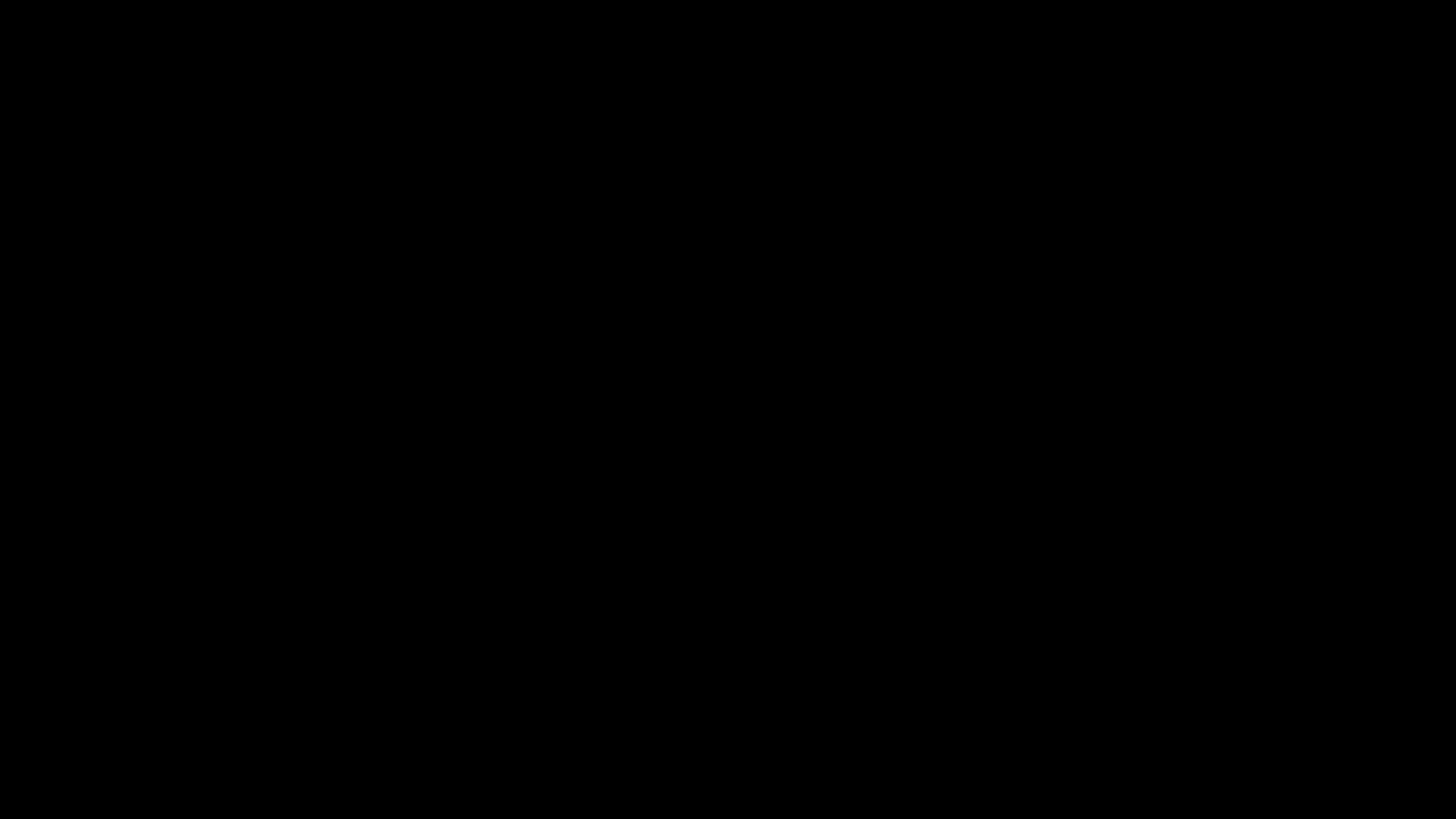
How many vendors do I have available?

How long does it take to serve and sell?

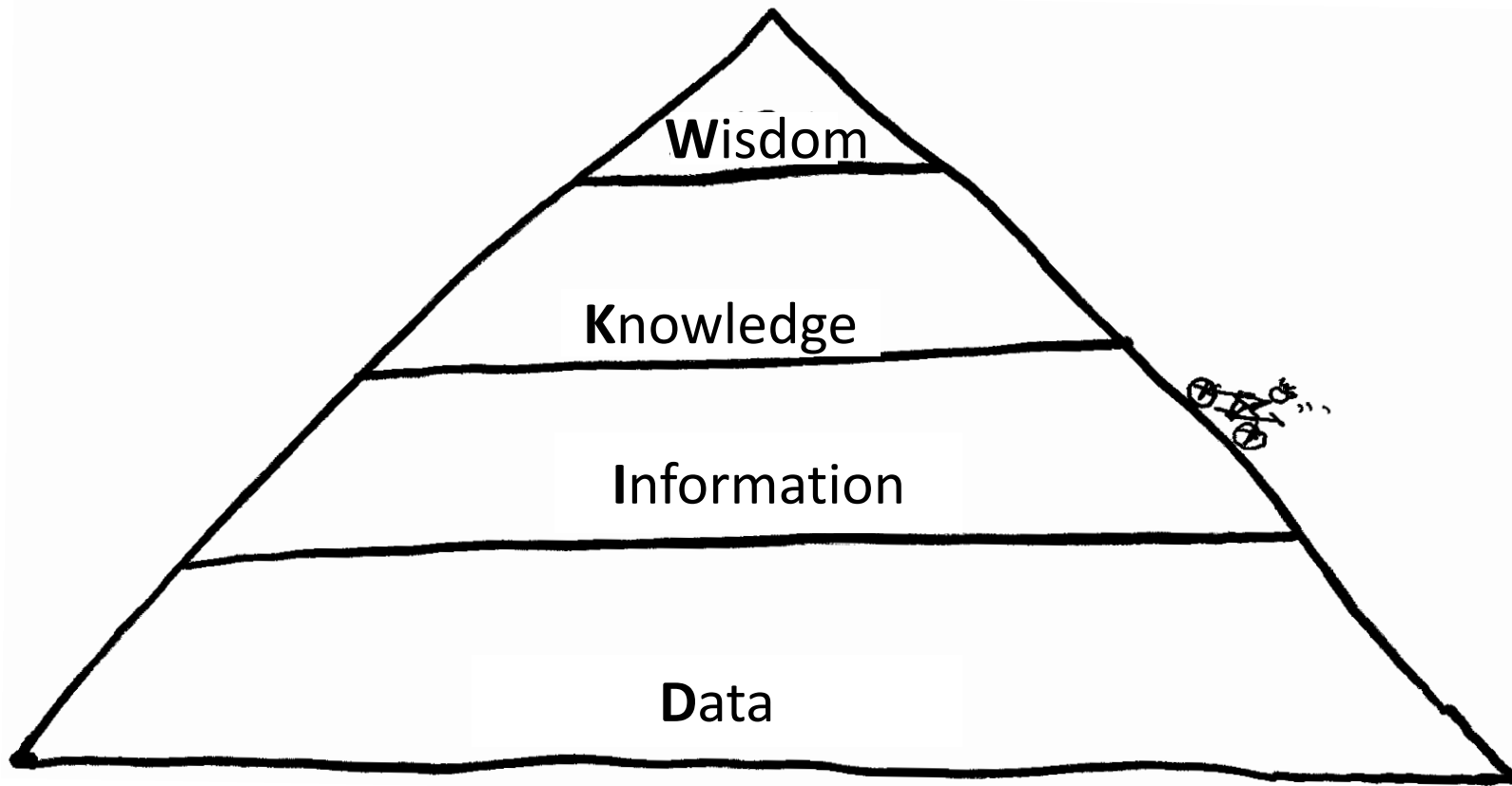
The model needs data and information.



The model generates further information & helps to generate knowledge.

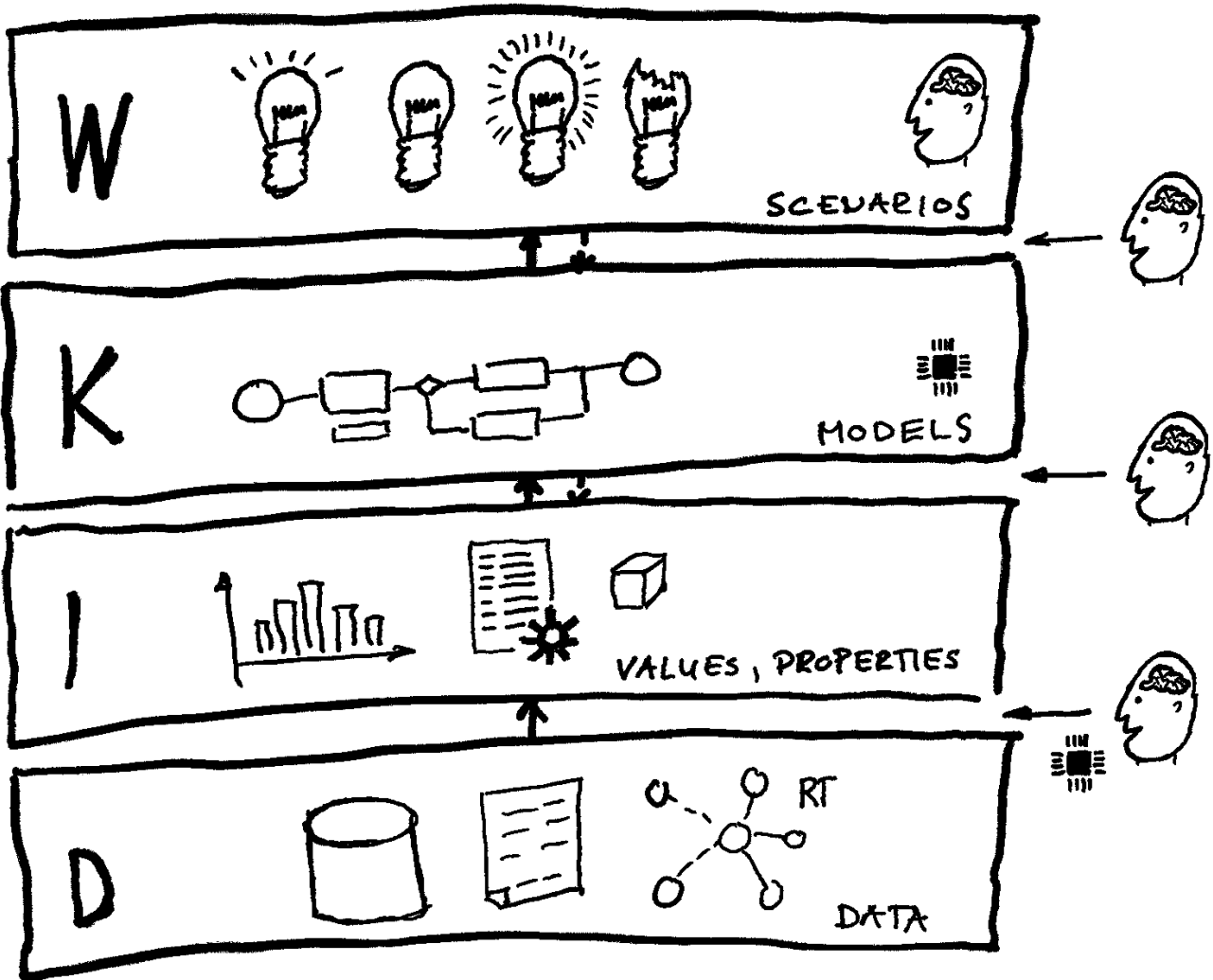


# Basics | Simulation Modeling | **DIKW Architecture**



Typically, information is defined in terms of data, knowledge in terms of information, and wisdom in terms of knowledge.

Knowledge generation and codification are essential parts of knowledge management.



Models promote knowledge generation, capture the organization's knowledge and usually convey understanding in an intuitive way.

Simulation modeling assist human experts in decision-making.



# Is a Simulation Modeler also an Information Architect?

By giving information structure, we learn to understand.

We do this to encourage others to explore and understand.

By being curious, we recognize our own and others' discovery strategies.

(World IA Day 2021)

Modeling helps us understand a problem and find our way to knowledge and better informed decisions.

# Basics | Simulation Modeling | DIKW Architecture

Information is not knowledge,  
Knowledge is not wisdom,  
Wisdom is not truth,  
Truth is not beauty,  
Beauty is not love,  
Love is not music,  
and Music is the best!

Zappa, Frank. "Packard Goose."  
Joe's Garage Acts I, II & III. 1979.



**Dr Eugen Rodel**

Doctor of Business Administration, Master of Engineering

Senior Research Associate

[eugen.rodel@hslu.ch](mailto:eugen.rodel@hslu.ch)

