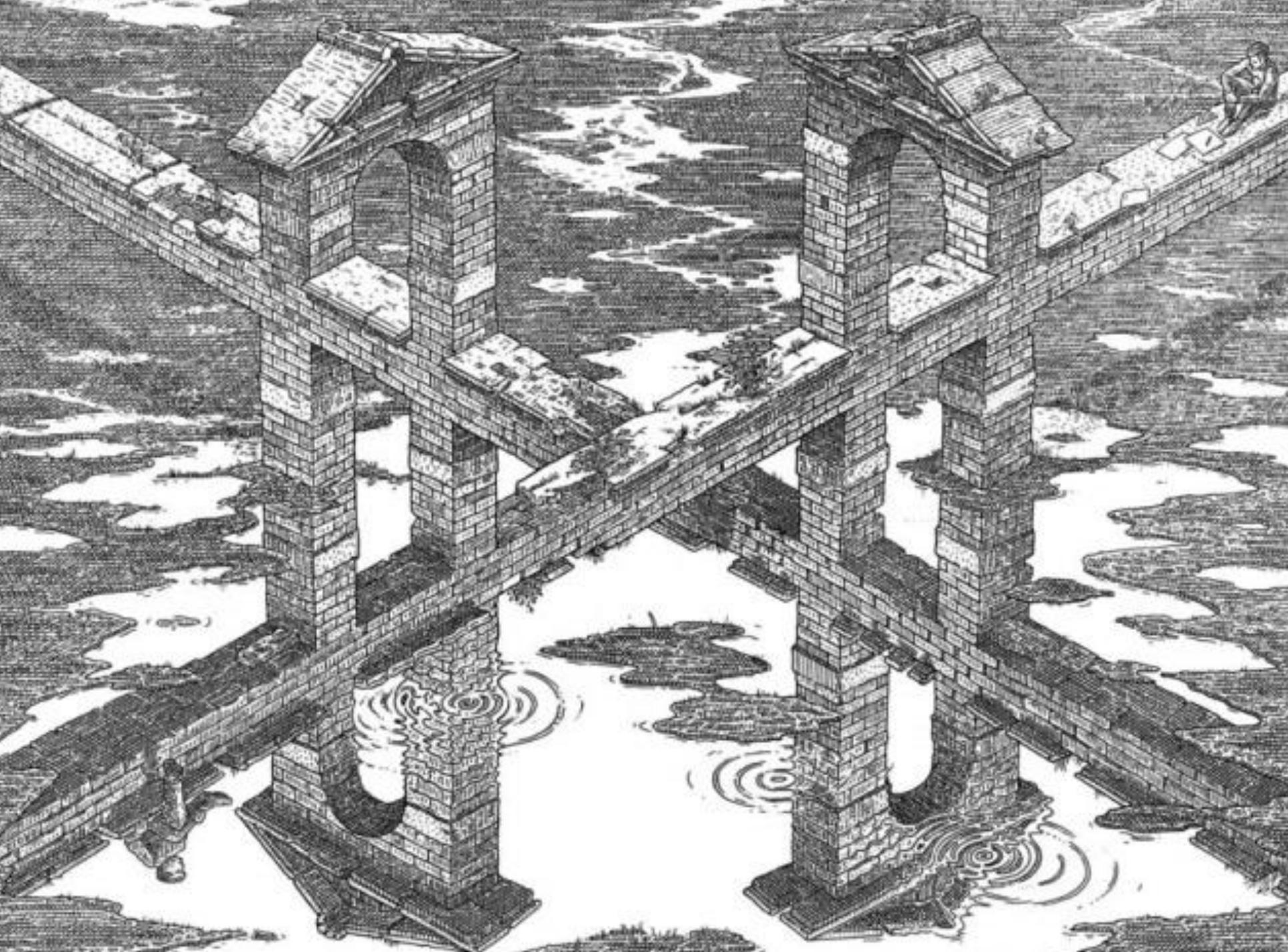


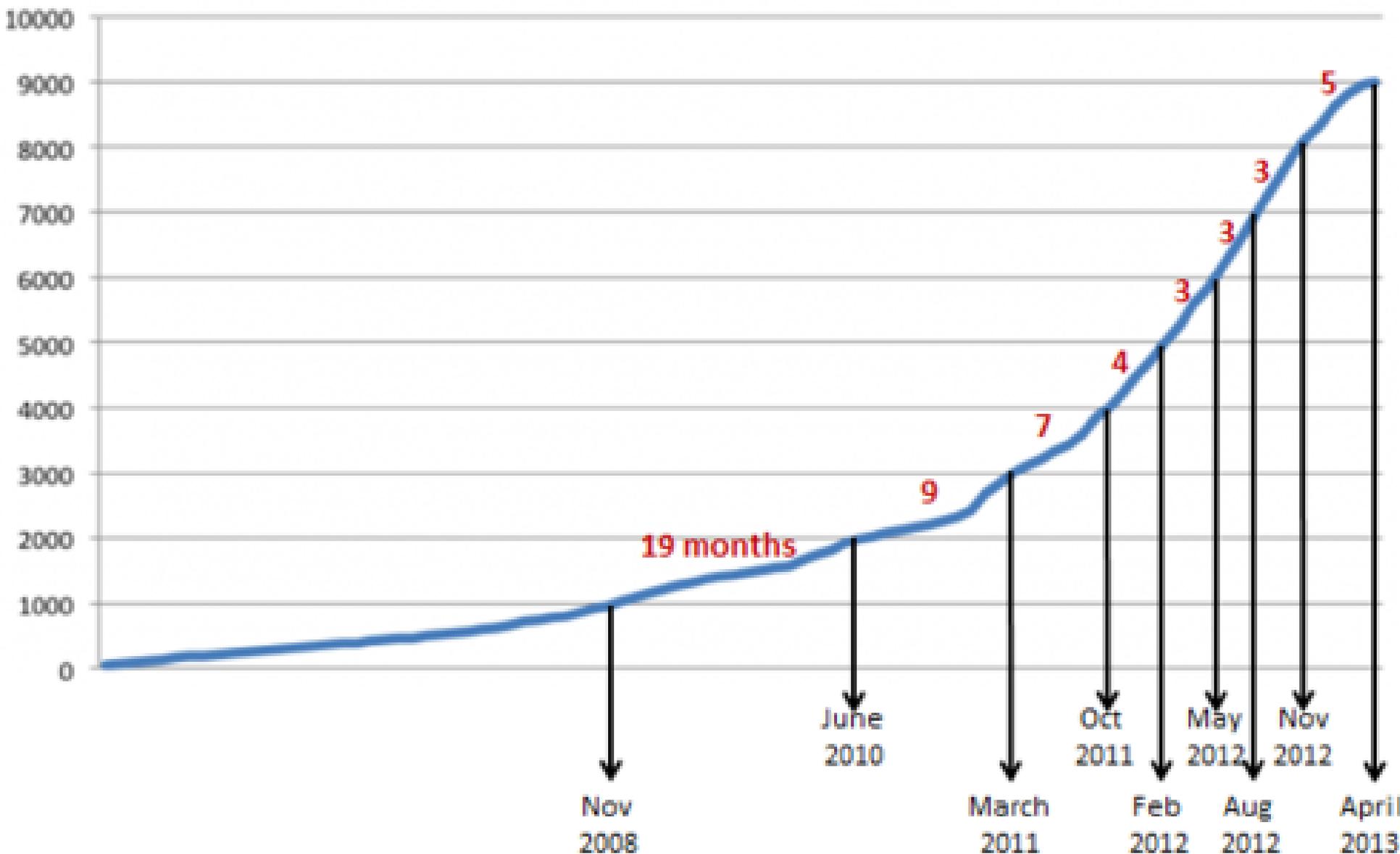
# Self-Replication, Strandbeest, and the Game of Life.

*What John von Neumann, Theo Jansen, and John Conway can tell us about scaling the API Economy.*

Mike Amundsen  
Director of Architecture,  
API Academy – CA Technologies  
@mamund

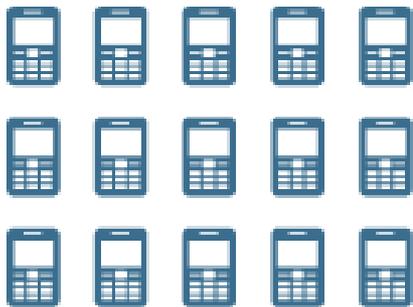


# ProgrammableWeb API Growth 2005 - 2013



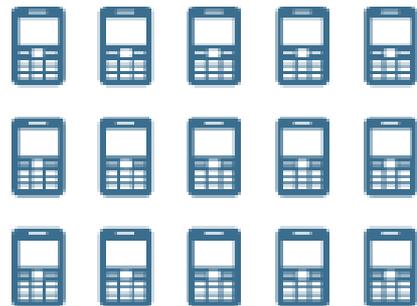
# 15B

CONNECTED  
DEVICES IN 2015



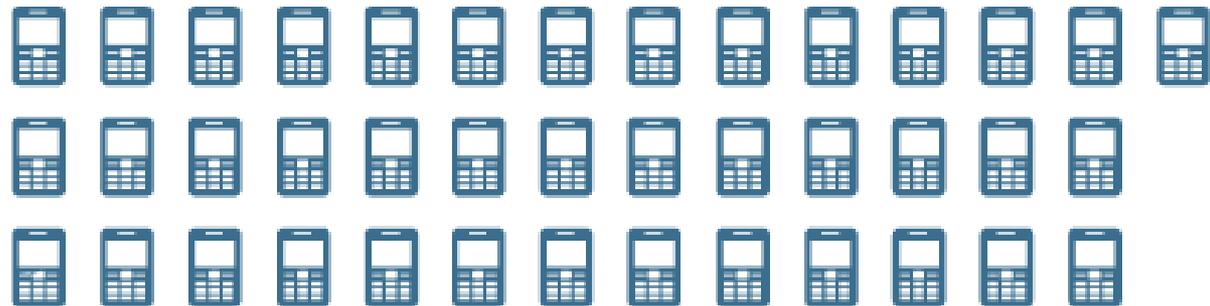
# 15B

CONNECTED  
DEVICES IN 2015

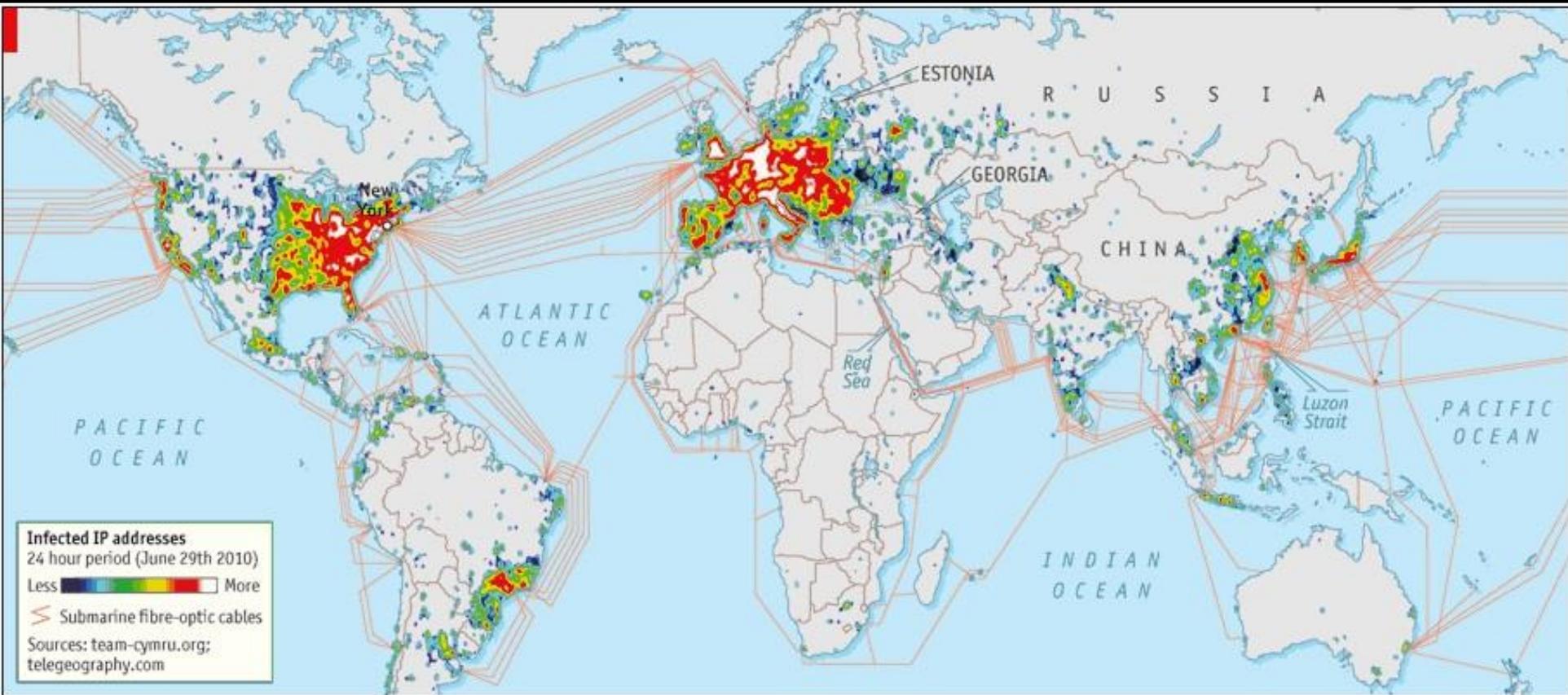


# 40B

CONNECTED  
DEVICES BY 2020



= 1B DEVICES













*"I just had to take the hypertext idea and connect it to the Transmission Control Protocol and domain name system ideas and—ta-da!—the World Wide Web." - Tim Berners-Lee*



ORGANISATION EUROPEENNE POUR LA RECHERCHE  
**CERN** EUROPEAN ORGANIZATION FOR NUCLEAR  
 RESEARCH  
 1211 GENEVE 23 (SUISSE)

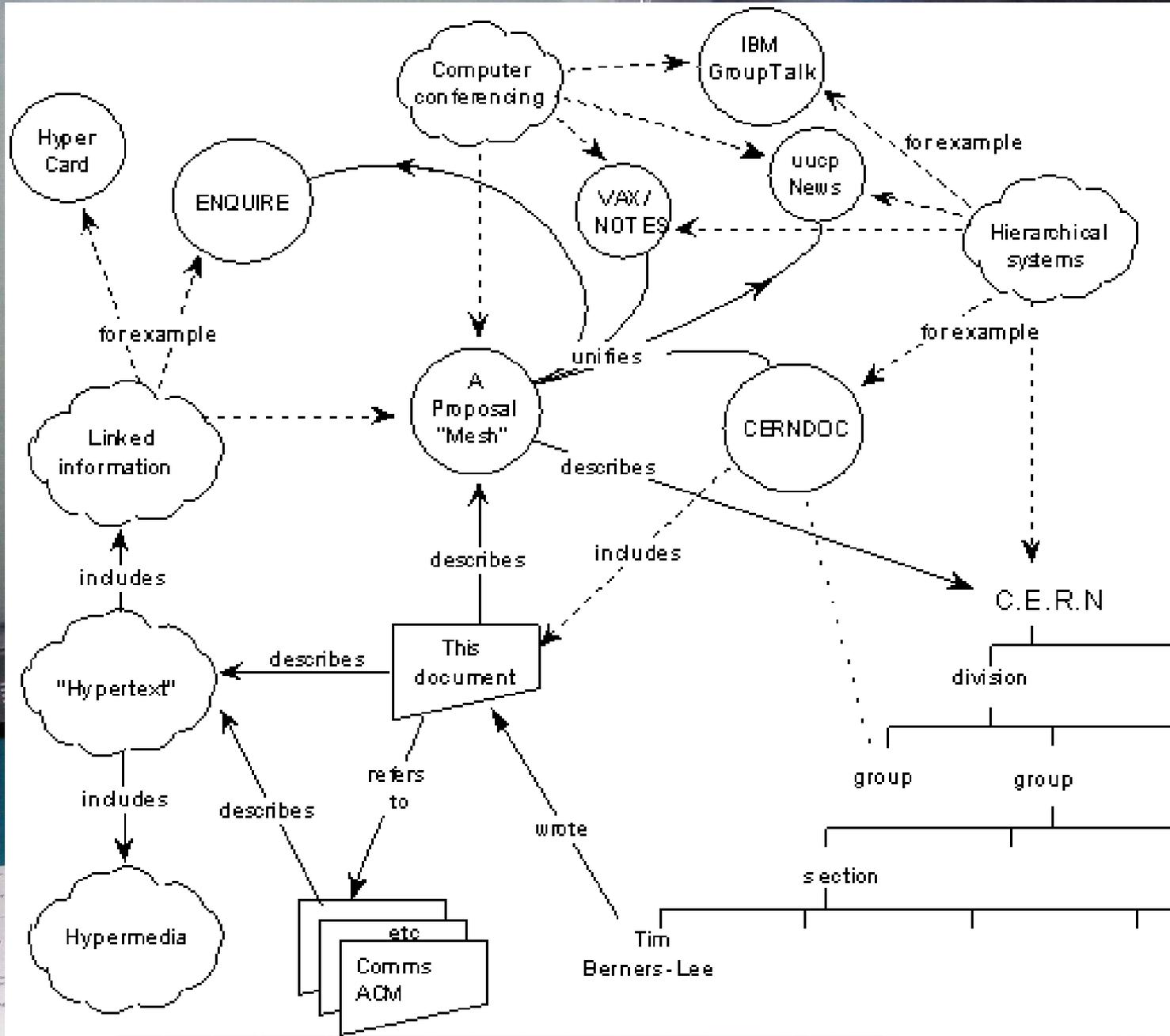
**THIS machine is a user  
 DO NOT POWER  
 IT DOWN!!**

Management: A Proposal  
 March 1988

Information about acceleration and experiments at  
 CERN about complex existing systems and delivers a  
 management retrieval. Information management. Project



... 744. Dream of Daria in a progre-  
 ... 745. ...  
 ... 746. ...  
 ... 747. ...  
 ... 748. ...  
 ... 749. ...  
 ... 750. ...  
 ... 751. ...  
 ... 752. ...  
 ... 753. ...  
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 ... 757. ...  
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 ... 759. ...  
 ... 760. ...

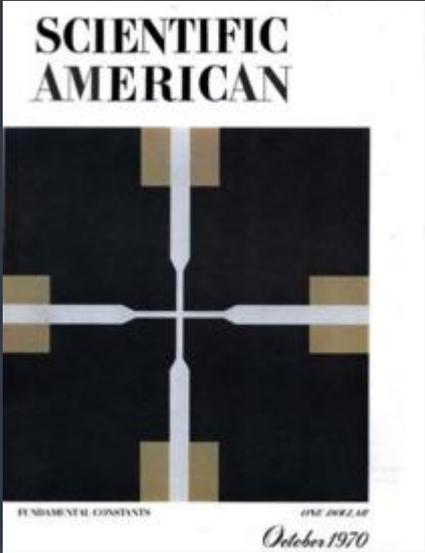
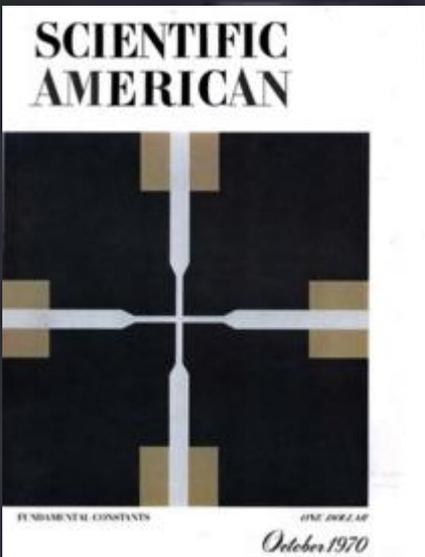
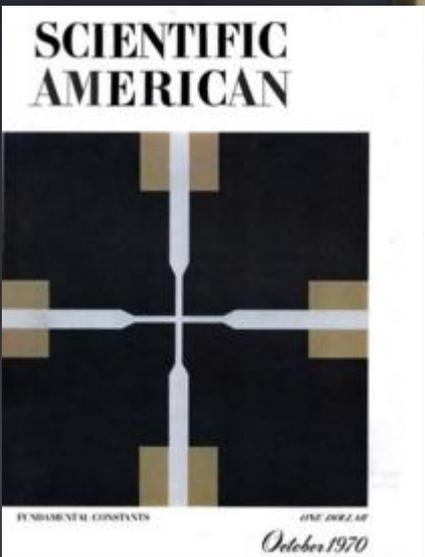




ATLAS  
— OF —  
FINITE GROUPS

J. H. CONWAY  
R. T. CURTIS  
S. P. NORTON

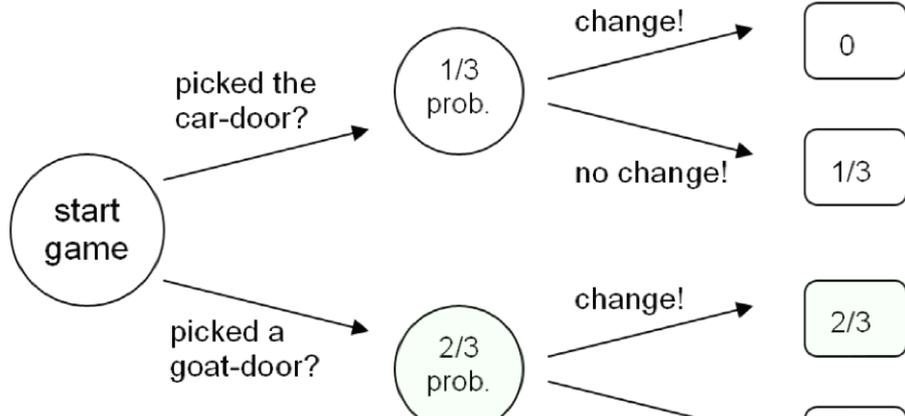
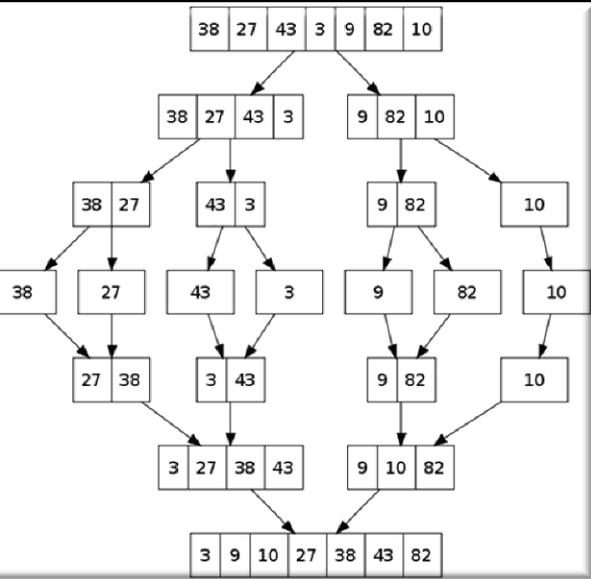




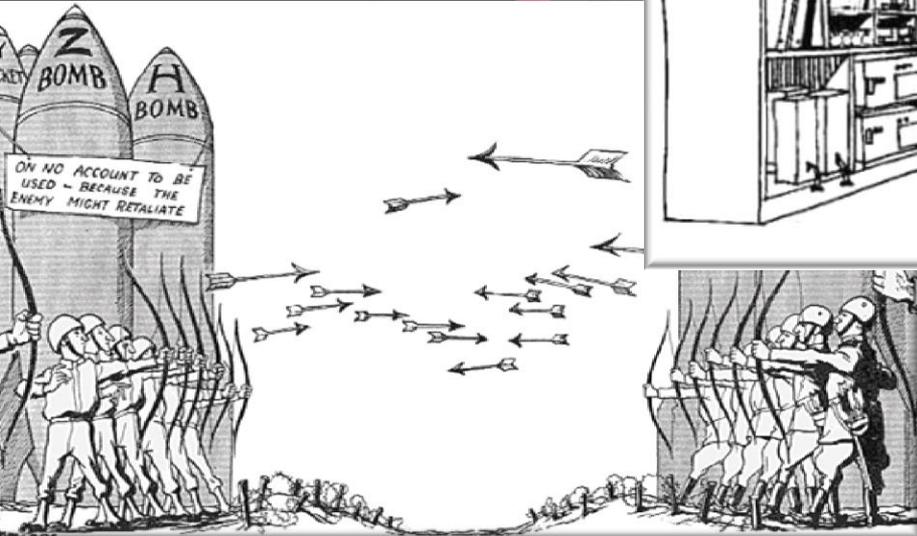
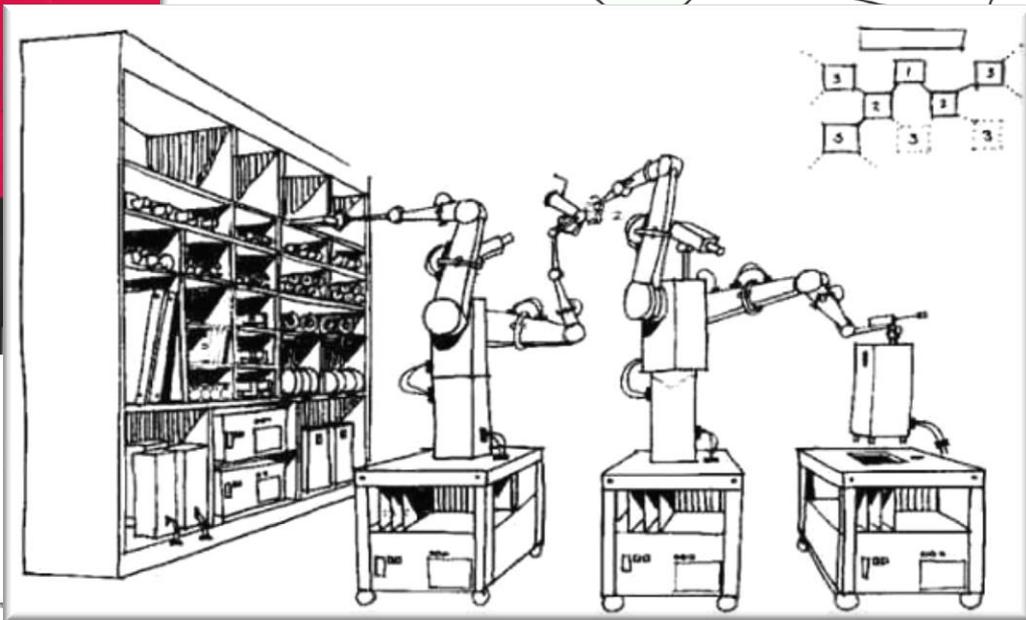








PRINCETON LA  
IN MATHEN



Profit	Win
(94,036)	
(87,050)	
(80,064)	
(73,079)	
(66,093)	
(59,107)	
(52,121)	
(45,135)	
(38,149)	
(31,163)	
(24,177)	
(17,192)	
(10,206)	
(3,220)	
3,766	
10,752	
17,738	
24,724	
31,710	
38,696	
45,681	
52,667	
59,653	
66,639	
73,625	

- 19
- 20
- 21
- 22
- 23
- 24
- 25
- 26

Input	Output
X	Probability (Profit < X)
0	22.28%

20%	54,142
15%	60,870
10%	69,784
5%	82,602
Close to 0%	178,413
<b>Average</b>	<b>25,946</b>







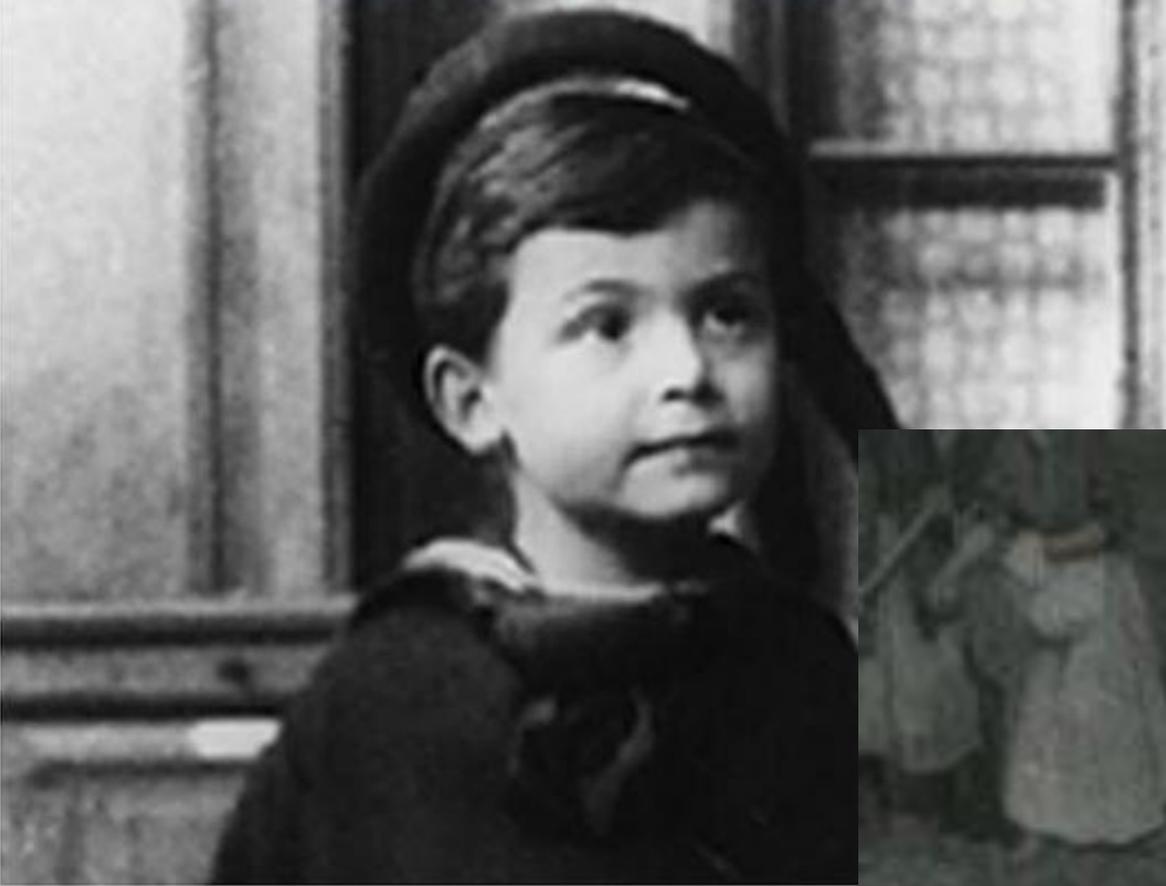






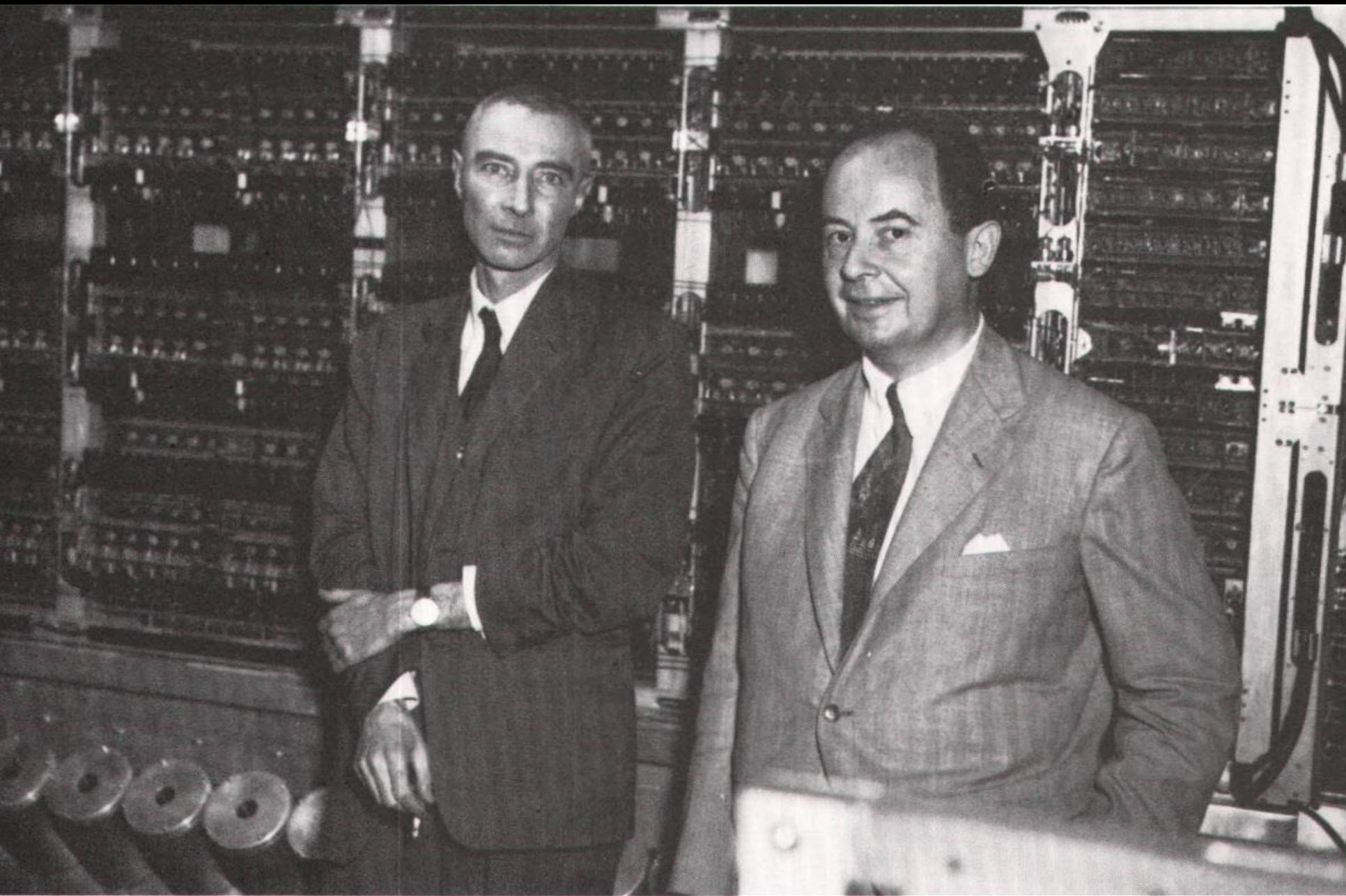




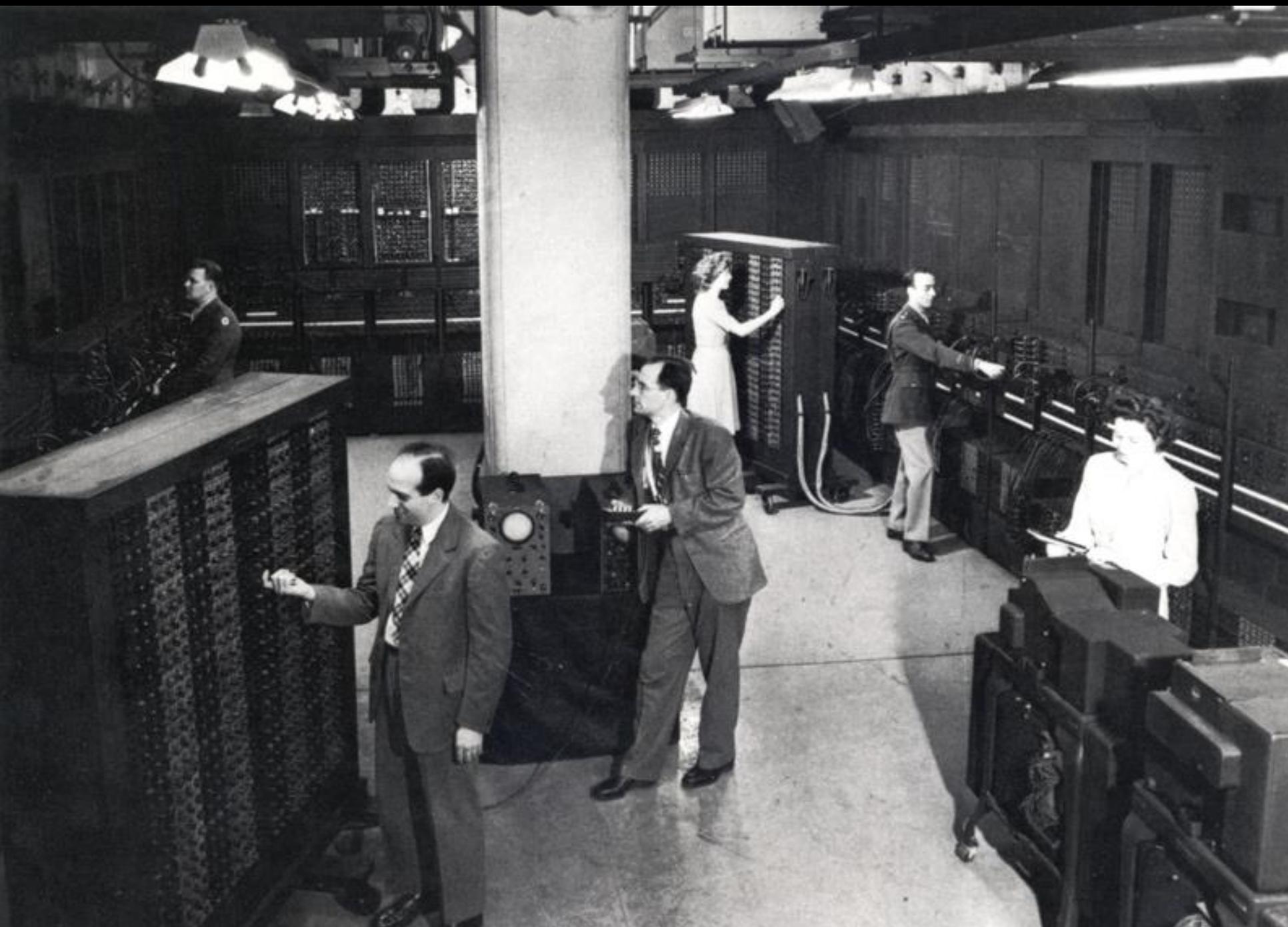






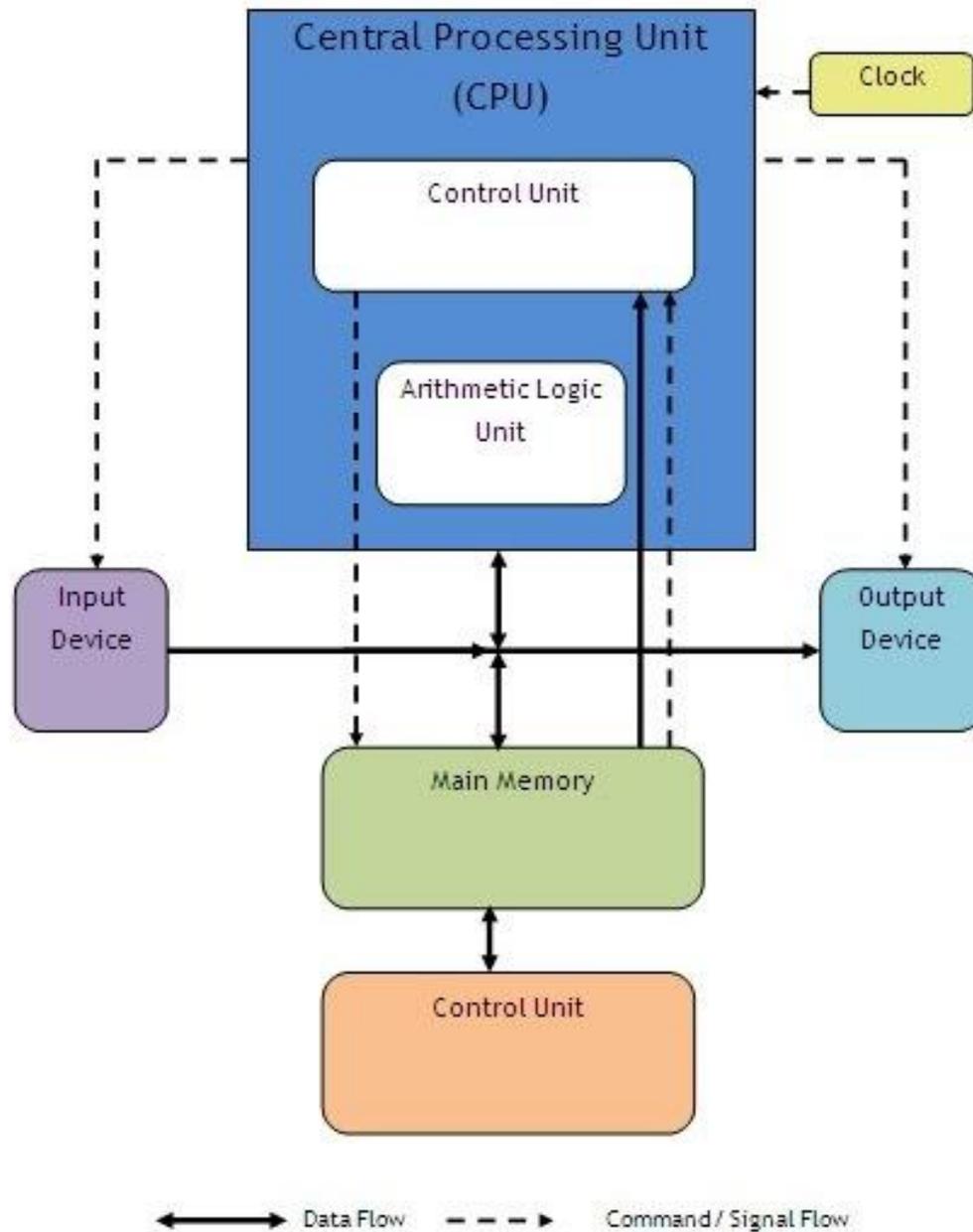


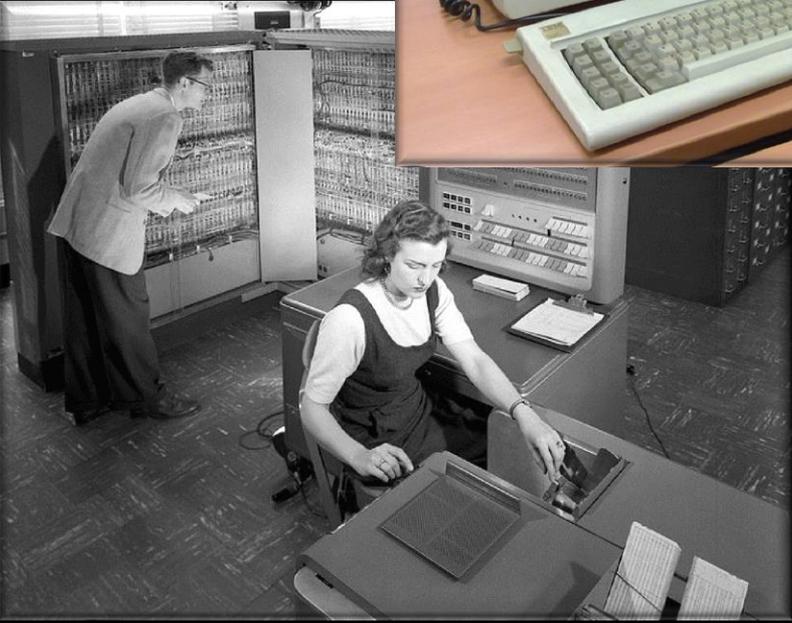




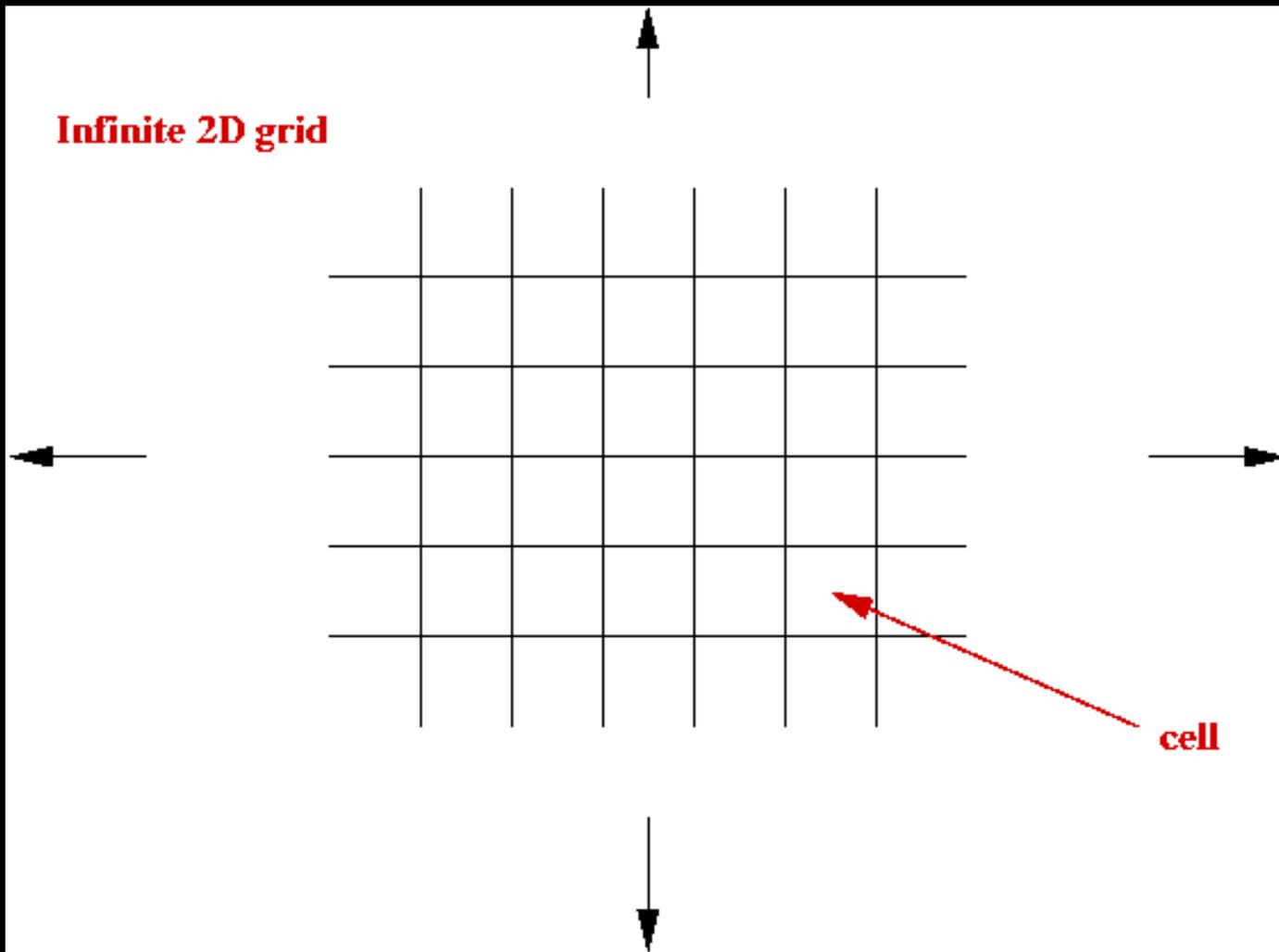


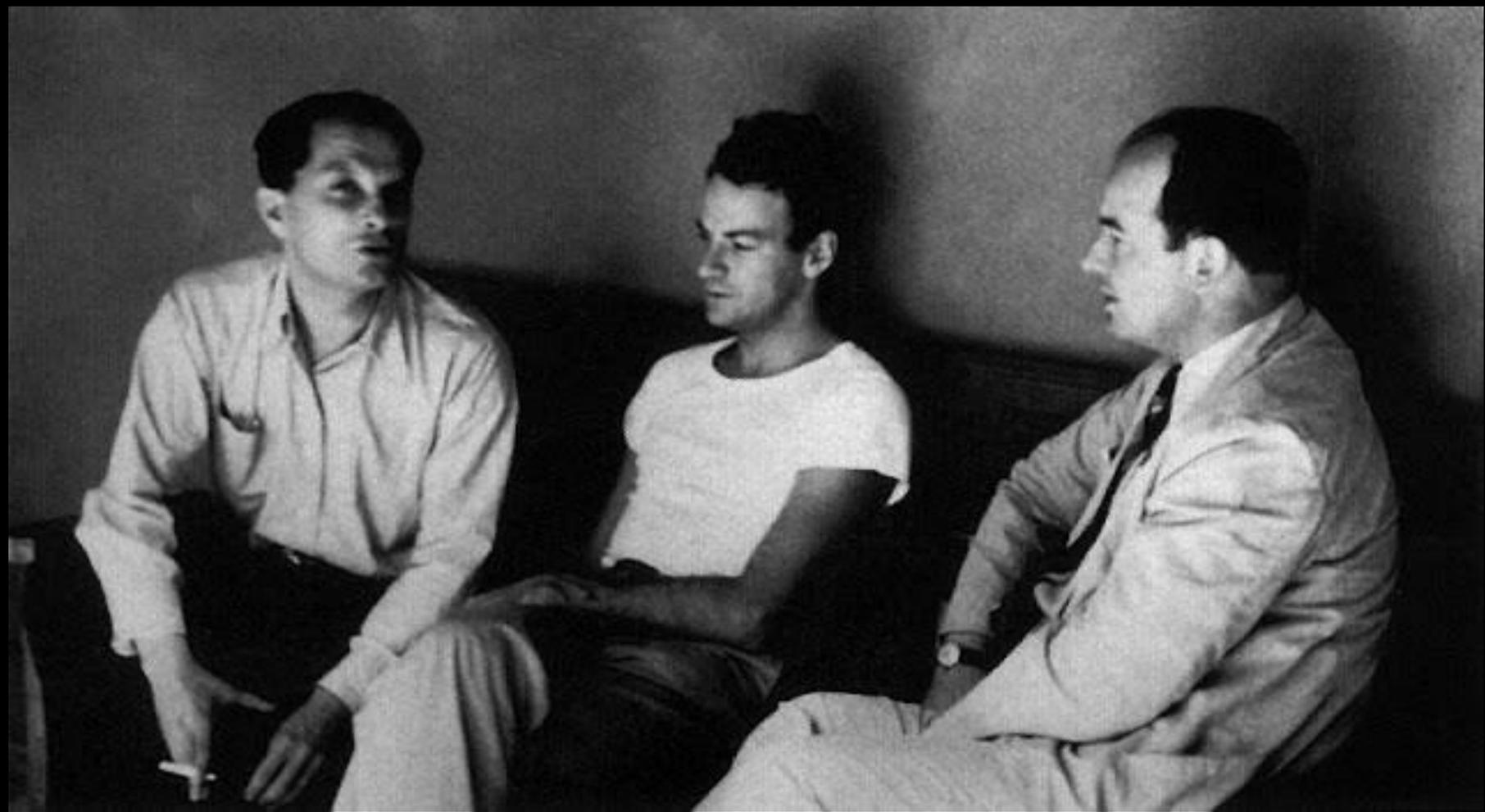
## Components of the Von Neumann Model





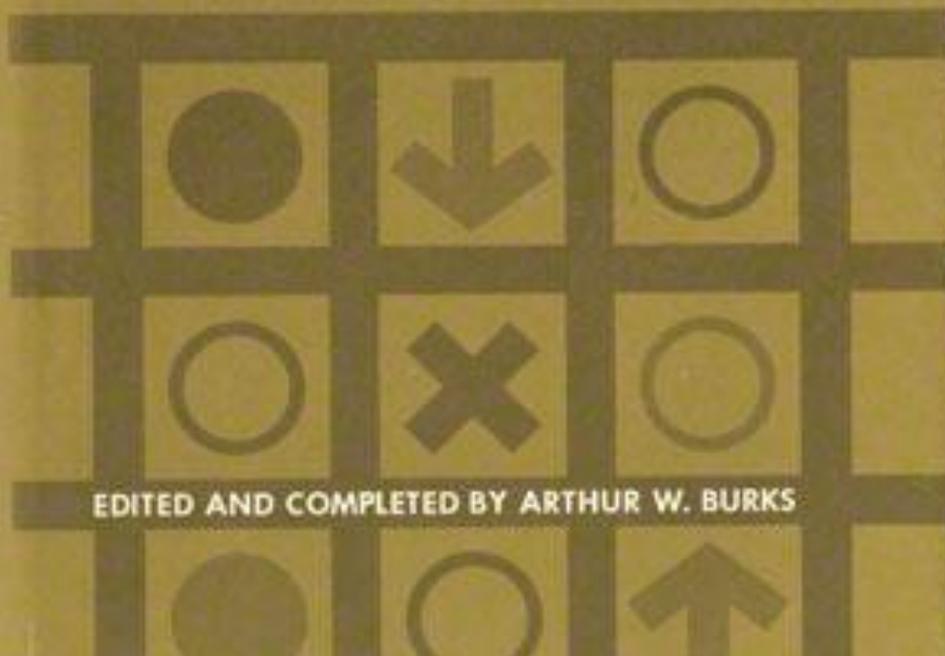
**Infinite 2D grid**





# THEORY OF SELF- REPRODUCING AUTOMATA

BY JOHN VON NEUMANN



EDITED AND COMPLETED BY ARTHUR W. BURKS

## Bubble Growth Rules

See the Bubble.PopulateGrowthConditionCases() method

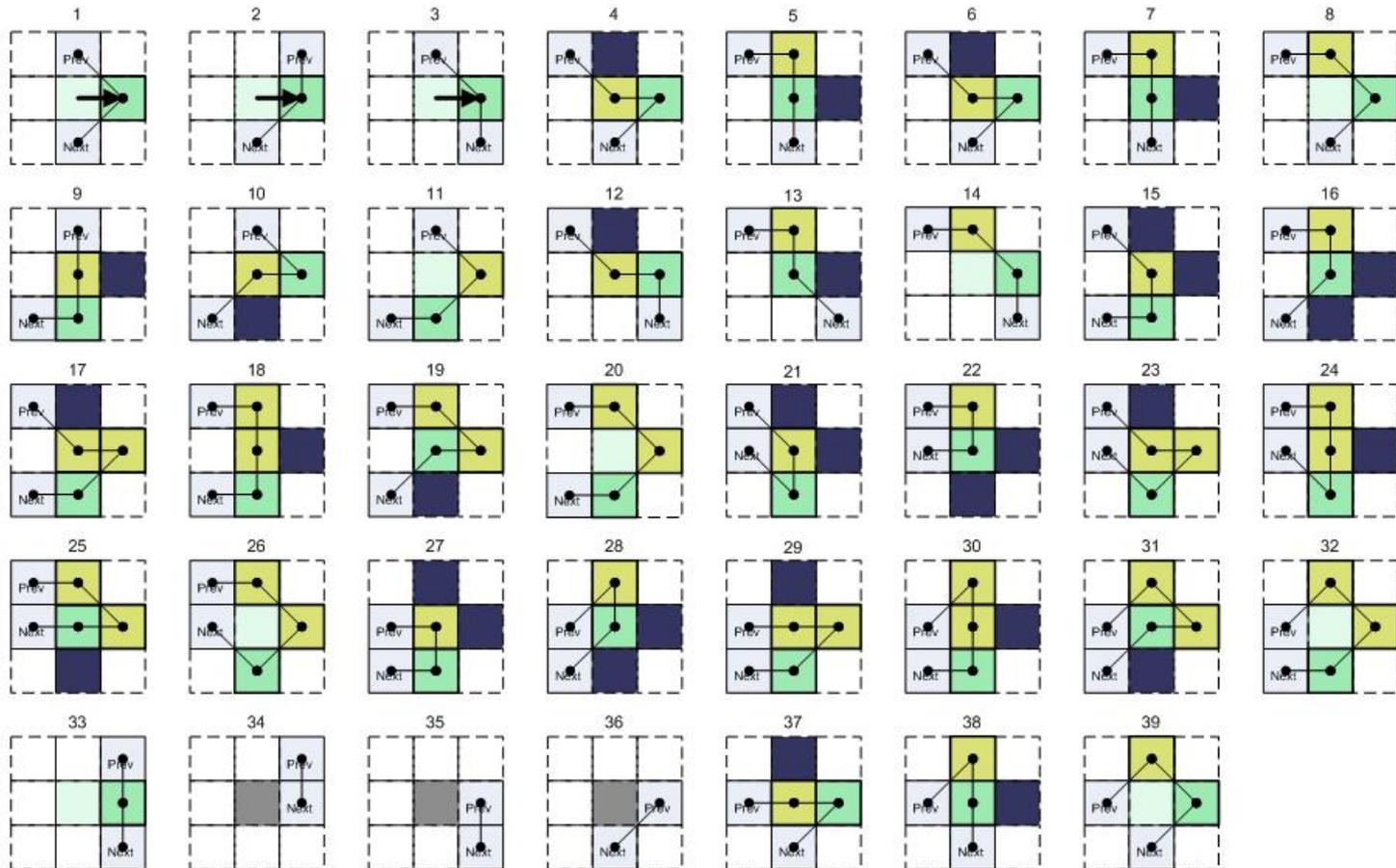
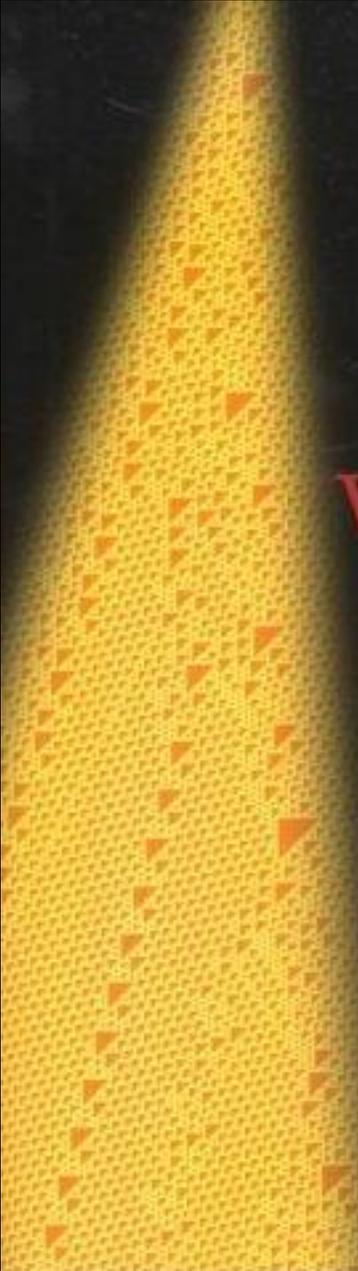


Figure 5: Cellular automaton growth rules

0	1	1	0	1	1	0	1	1
1	0	0	1	0	0	1	0	0
0	0	1	0	0	1	0	0	1
0	1	1	0	1	1	0	1	1
1	0	0	1	0	0	1	0	0
0	0	1	0	0	1	0	0	1
0	1	1	0	1	1	0	1	1
1	0	0	1	0	0	1	0	0
0	0	1	0	0	1	0	0	1





STEPHEN  
WOLFRAM  
A NEW  
KIND OF  
SCIENCE

## Bubble Growth Rules

See the Bubble.PopulateGrowthConditionCases() method

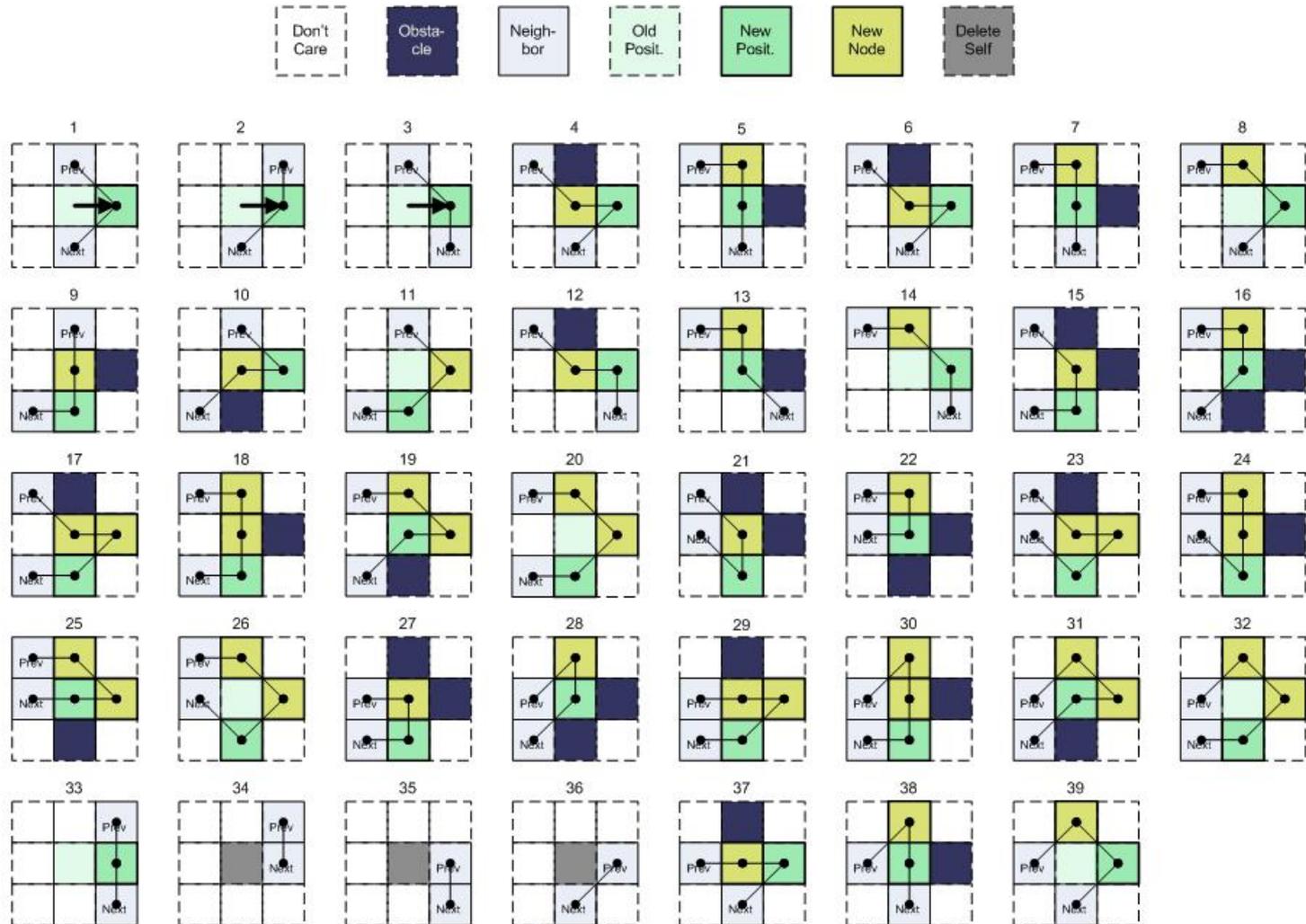
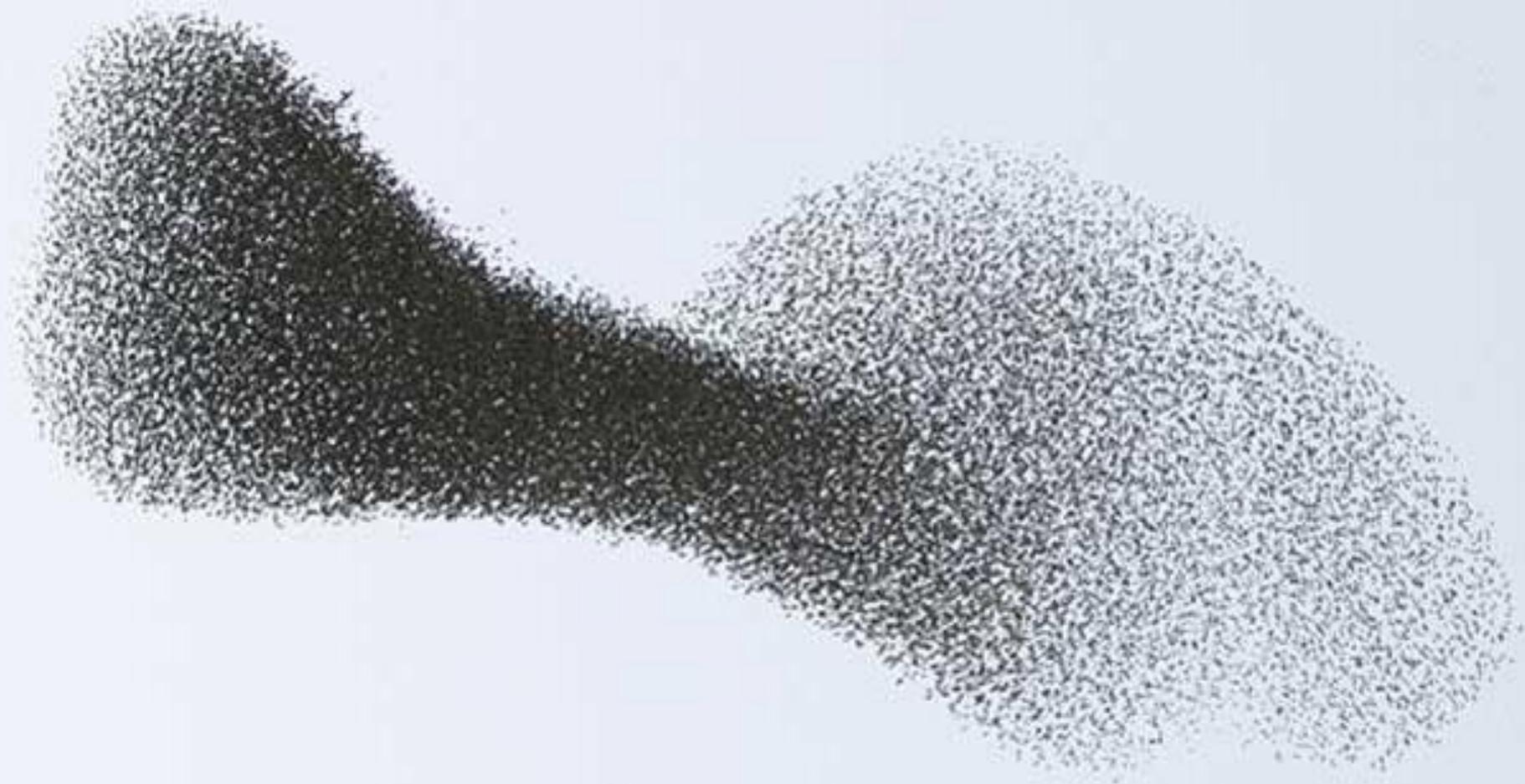


Figure 5: Cellular automaton growth rules









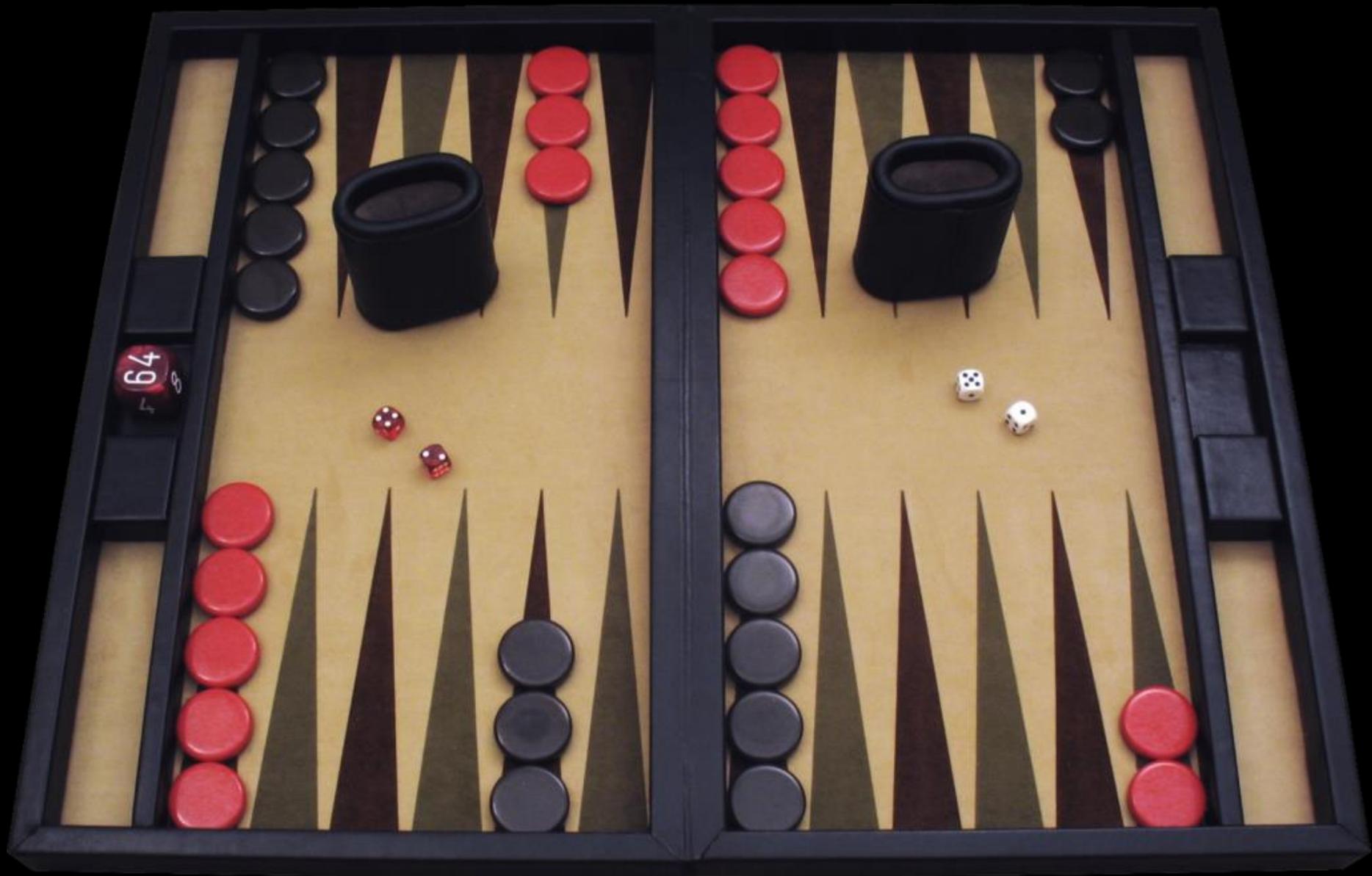




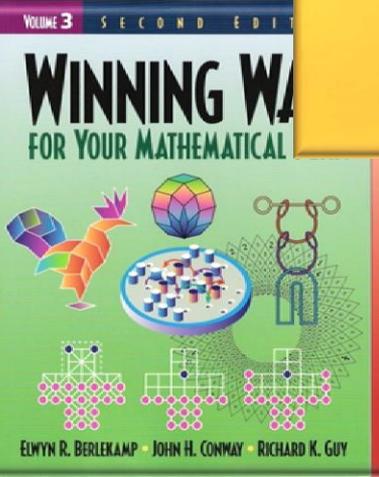
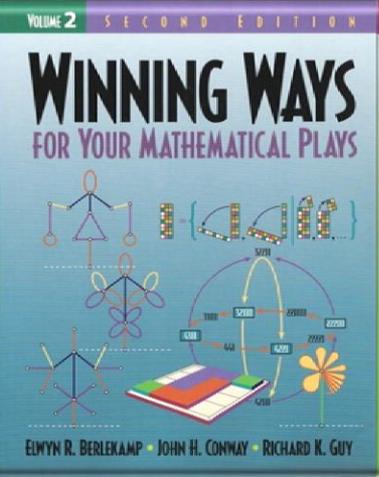
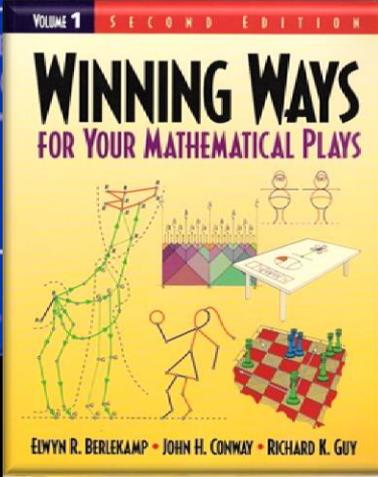
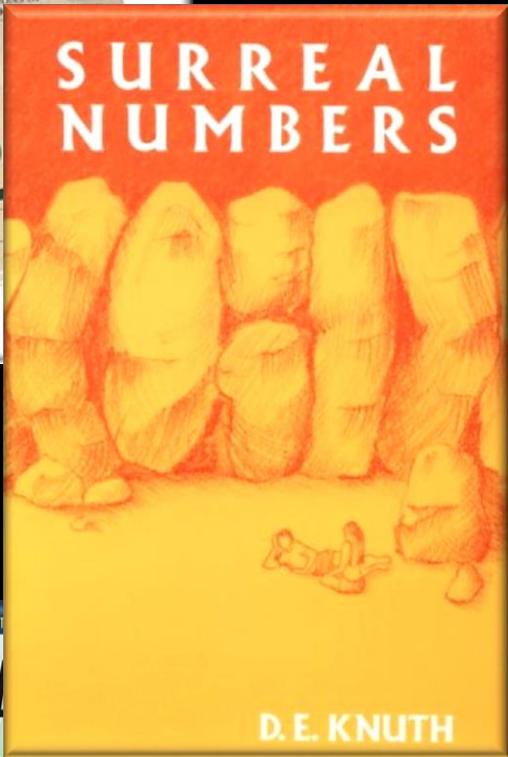
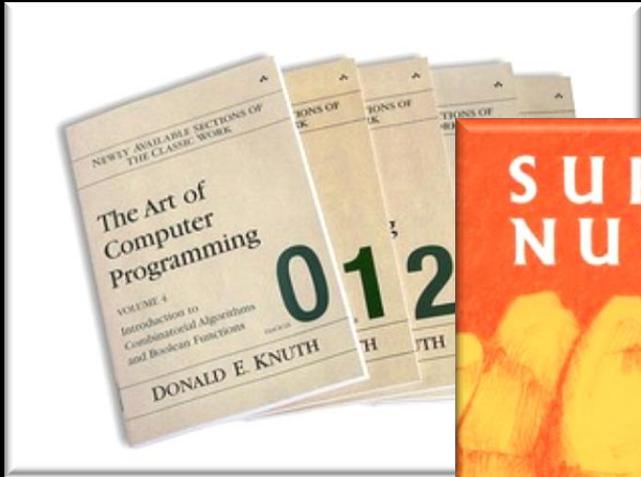
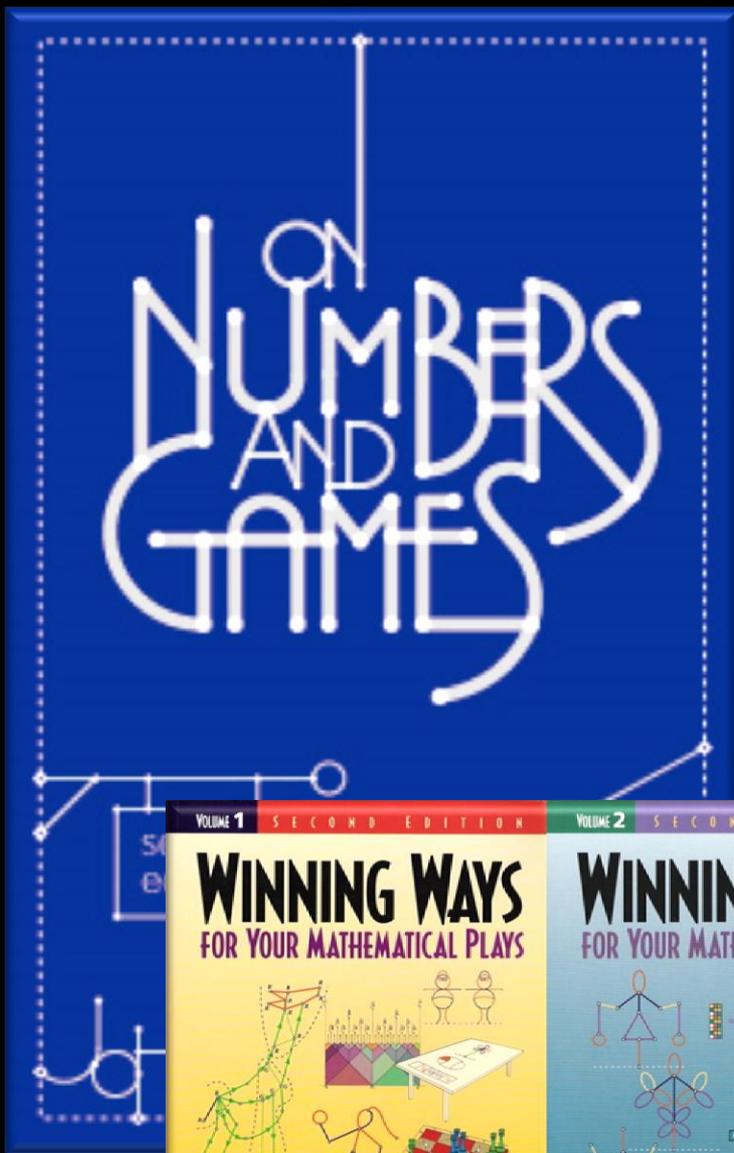


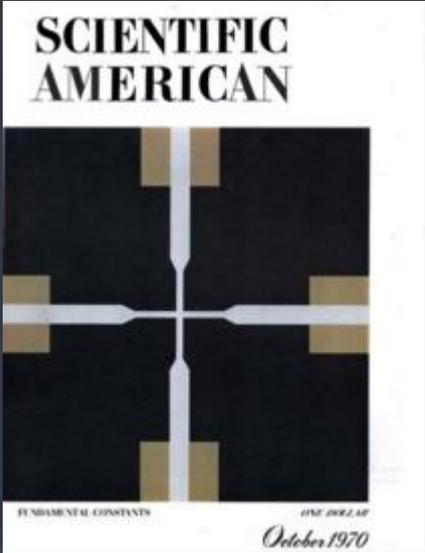
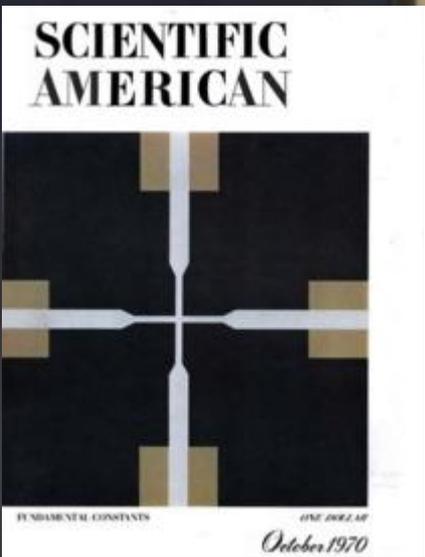












*“This month we consider Conway's latest brainchild, a fantastic solitaire pastime he calls ‘life’” - Martin Gardner, 1970*

0	1	1	1	0	0	0		0	0	0	0	0	0	0		0	0	0	0	0	0	0
0	1	1	2	1	0	0		1	1	2	2	1	0	0		0	0	1	1	1	0	0
1	3	5	3	2	0	0		1	1	4	2	2	0	0		1	1	3	1	2	0	0
1	1	3	2	2	0	0		1	3	4	3	2	0	0		1	1	5	3	3	0	0
1	2	3	2	1	0	0		0	2	2	3	1	0	0		1	2	3	2	2	0	0
0	0	0	0	0	0	0		0	1	1	1	0	0	0		0	1	2	2	1	0	0
0	0	0	0	0	0	0		0	0	0	0	0	0	0		0	0	0	0	0	0	0
Glider (1)								Glider (2)								Glider(3)						

0	0	0	0	0	0	0		0	0	0	0	0	0	0		0	0	0	0	0	0	0
0	1	1	1	0	0	0		0	0	1	1	1	0	0		0	0	1	1	1	0	0
0	1	1	3	2	1	0		0	0	1	1	2	1	0		0	0	1	1	2	1	0
0	2	4	4	2	1	0		0	1	3	5	3	2	0		0	1	3	5	3	2	0
0	1	2	2	3	1	0		0	1	1	3	2	2	0		0	1	1	3	2	2	0
0	1	2	2	1	0	0		0	1	2	3	2	1	0		0	1	2	3	2	1	0
0	0	0	0	0	0	0		0	0	0	0	0	0	0		0	0	0	0	0	0	0
Glider(4)								Glider (5, or 1 translated)														

## **1. Survivals:**

*Every counter with two or three neighboring counters survives for the next generation.*

## **2. Deaths:**

*Each counter with four or more neighbors dies (is removed) from overpopulation. Every counter with one neighbor or none dies from isolation.*

## **3. Births:**

*Each empty cell adjacent to exactly three neighbors--no more, no fewer--is a birth cell. A counter is placed on it at the next move.*

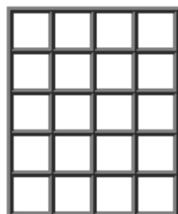
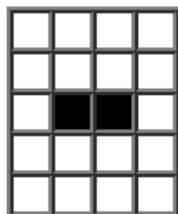
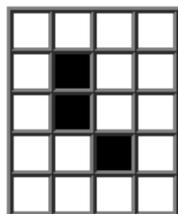
**moves**

**0**

**1**

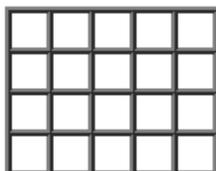
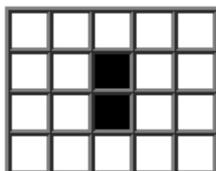
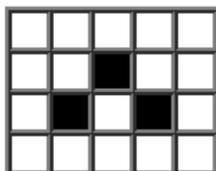
**2**

**a**



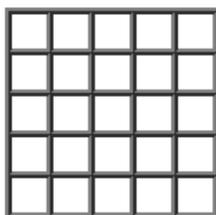
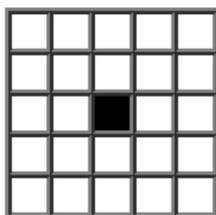
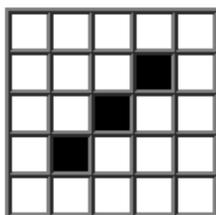
dies

**b**



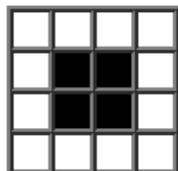
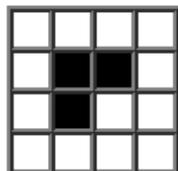
dies

**c**



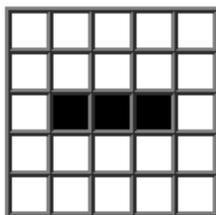
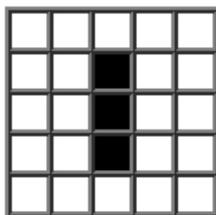
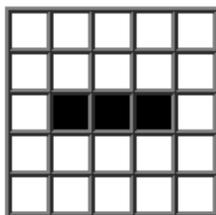
dies

**d**



block (stable)

**e**

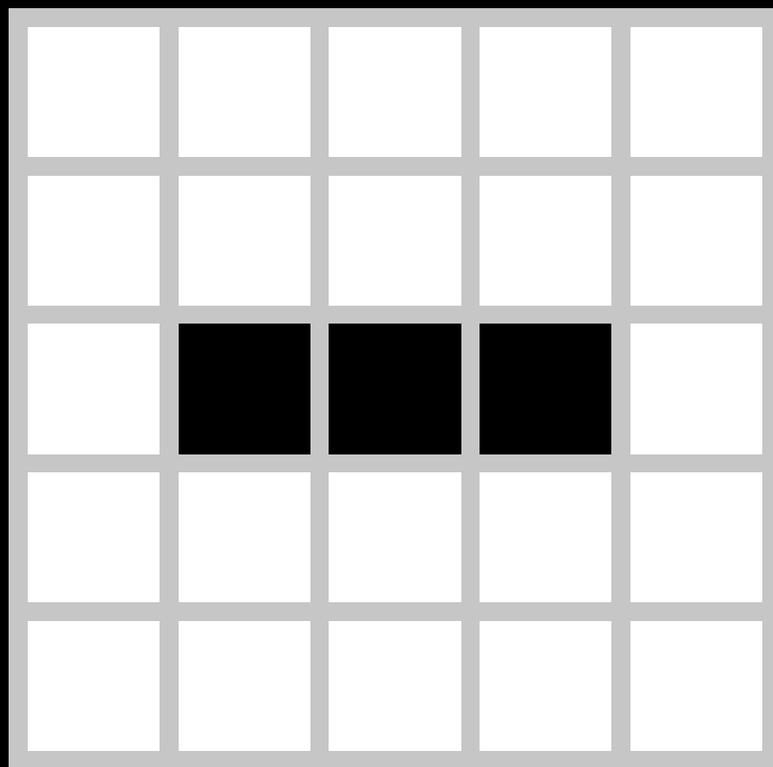


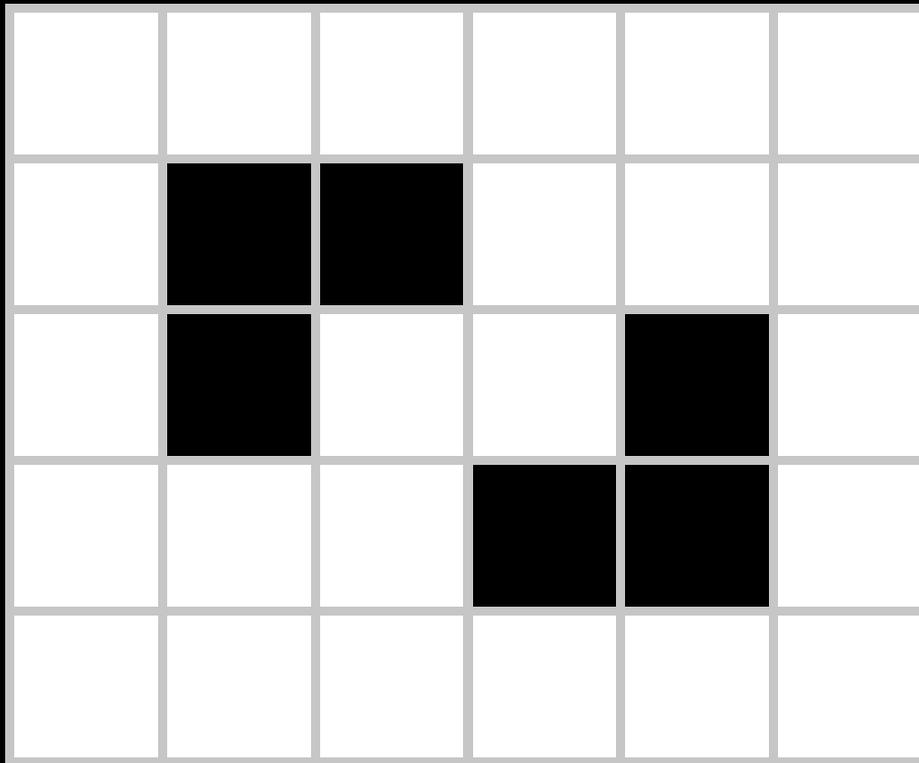
blinker (period 2)

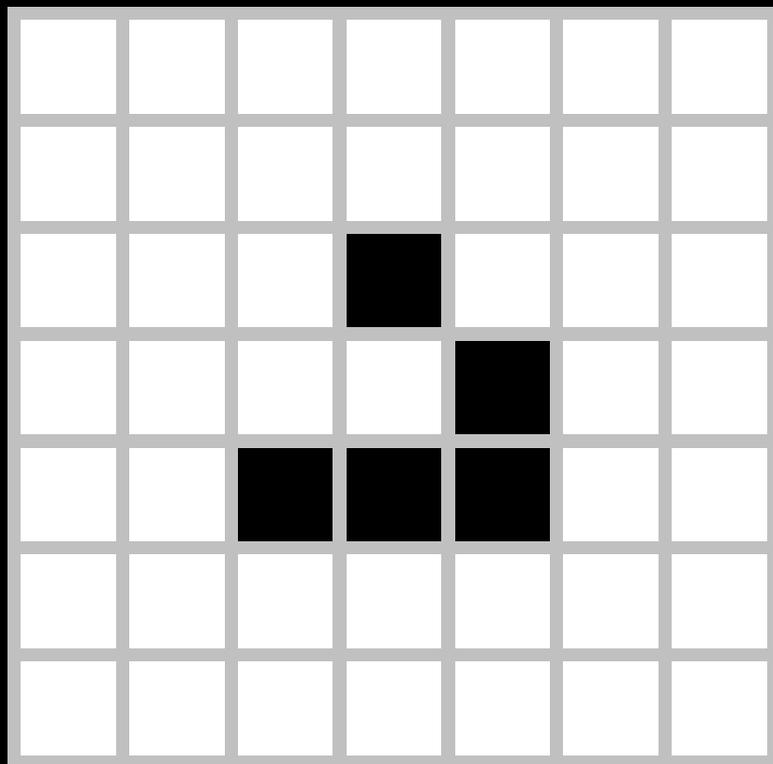
*“For long-lived populations Conway sometimes uses a PDP-7 computer with a screen on which he can observe the changes.”*

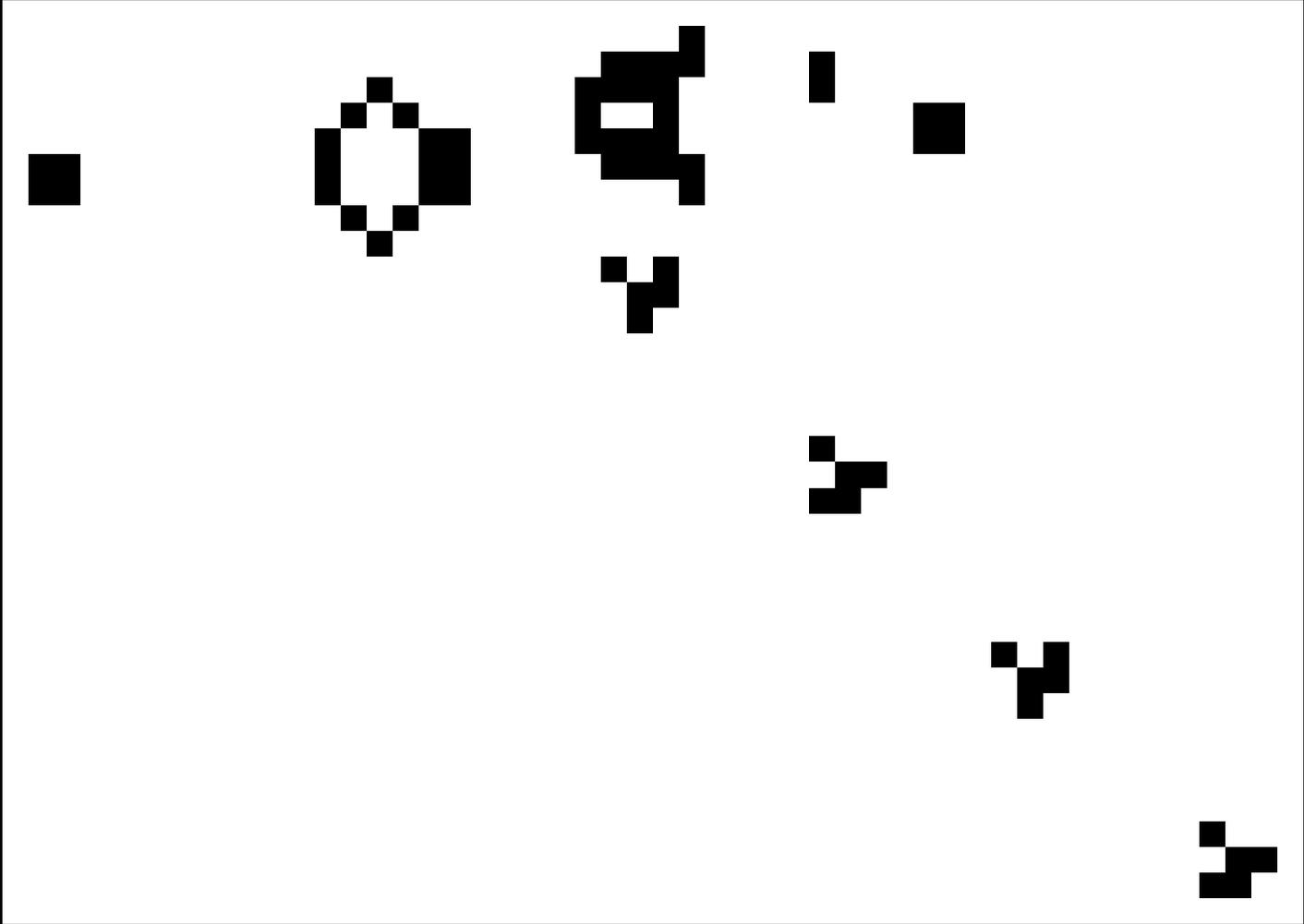
*- Martin Gardner, 1970*



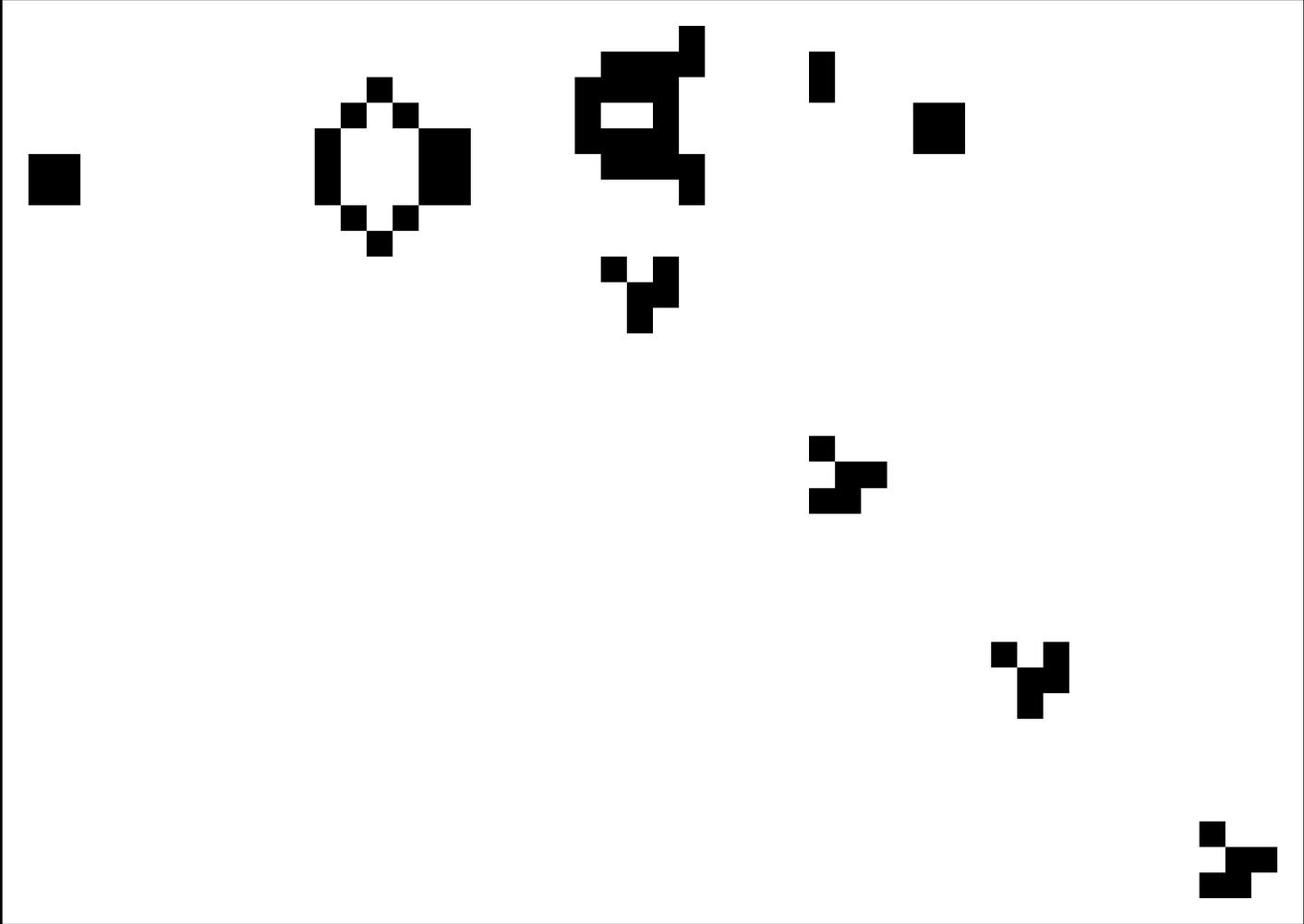




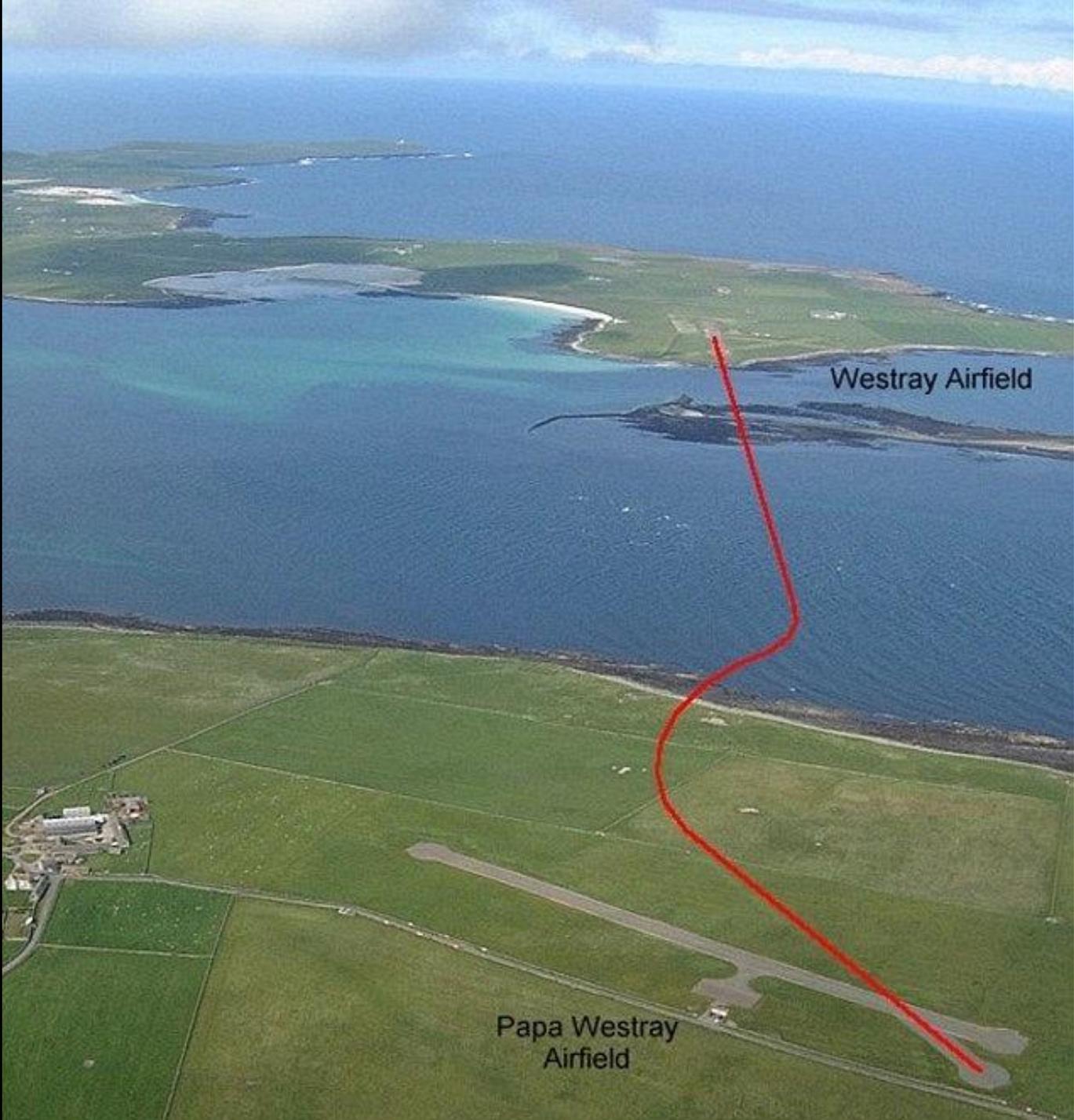






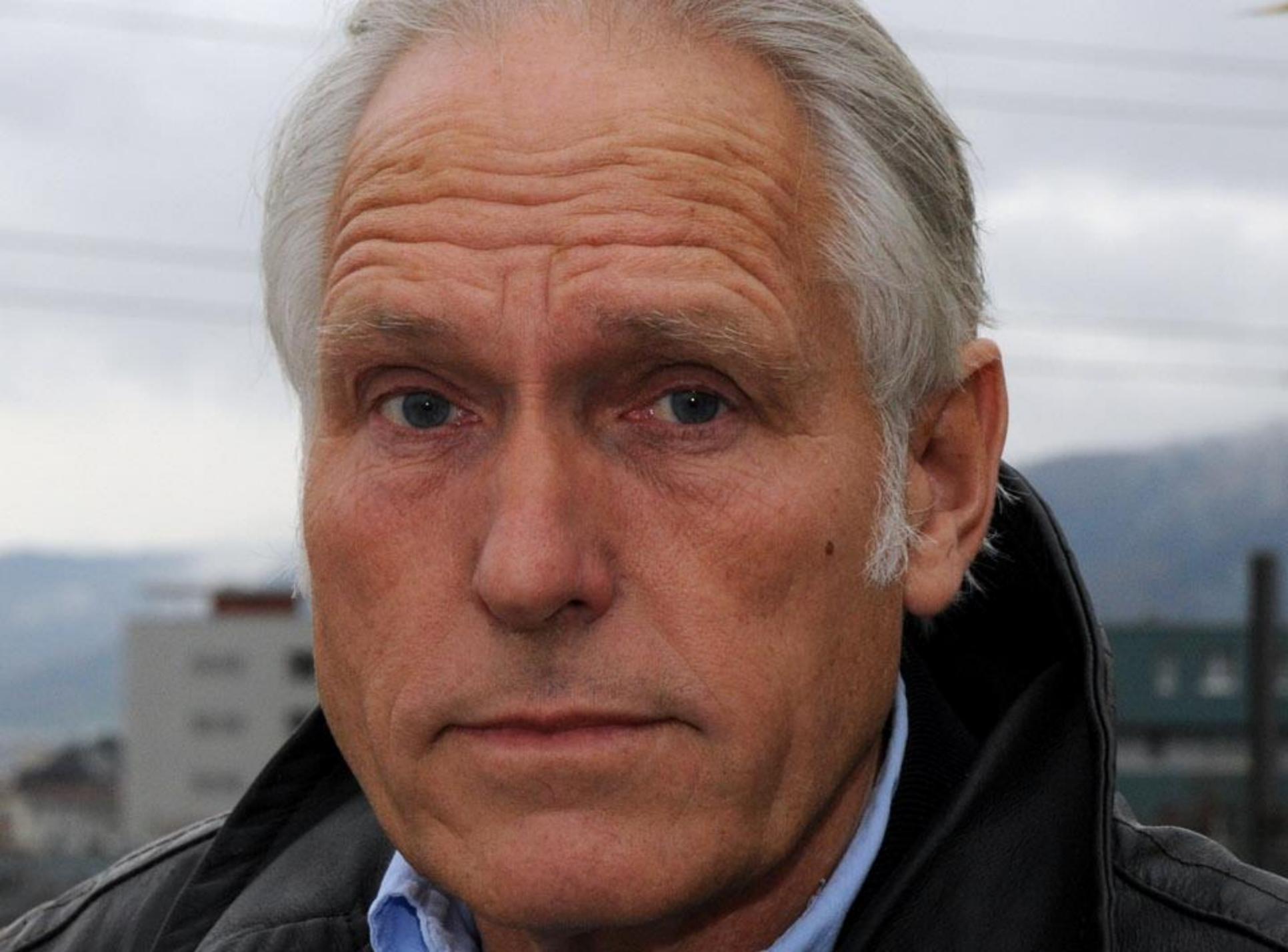






Westray Airfield

Papa Westray  
Airfield















Richard  
**Dawkins**

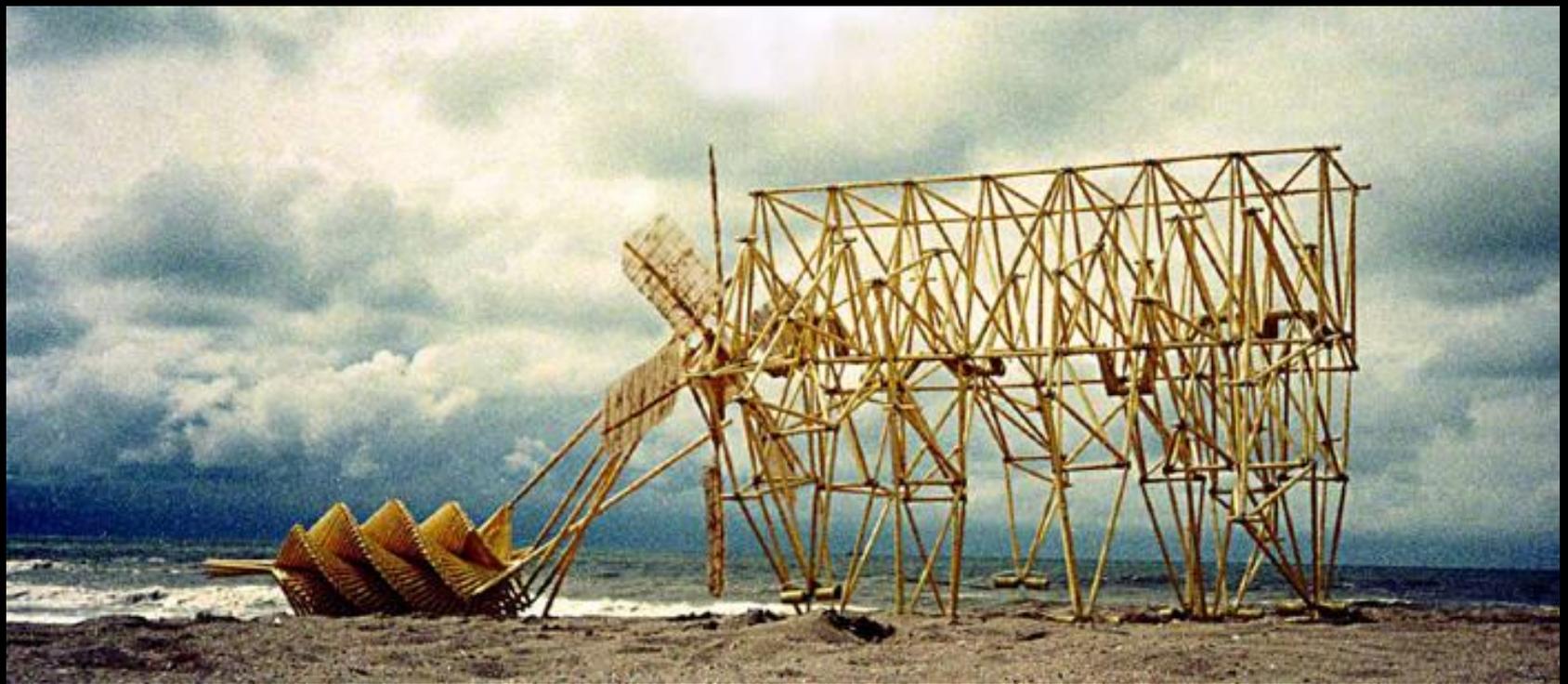
The Blind  
Watchmaker

*"I started with the idea that I could make wind-powered 'animals' that would live on the beach and build up the dunes to save us from rising sea levels in the coming century." - Theo Jansen*



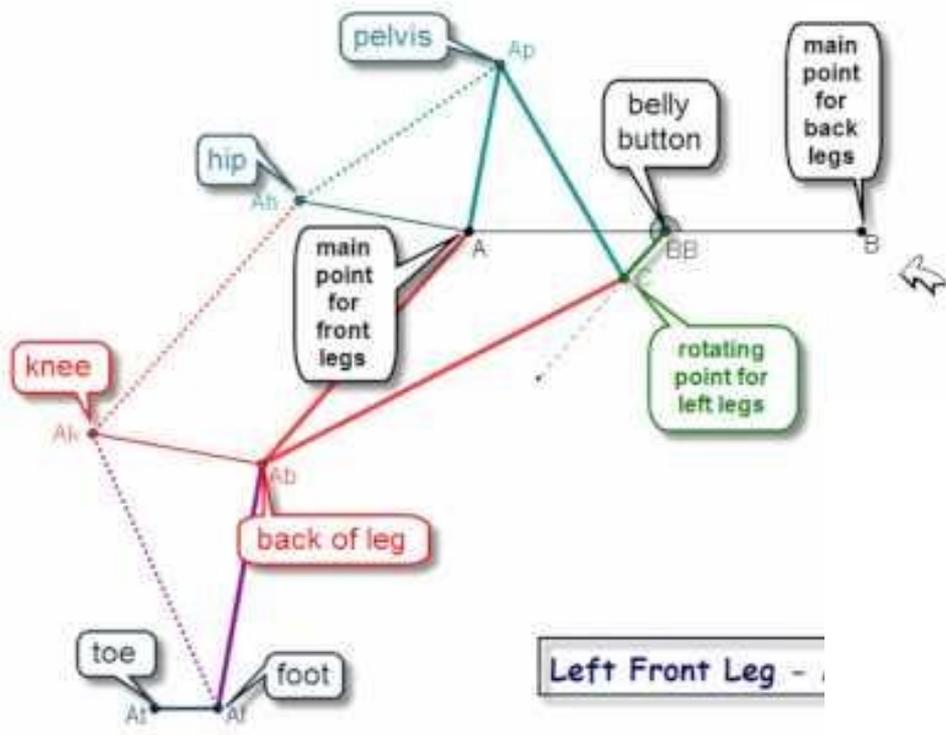






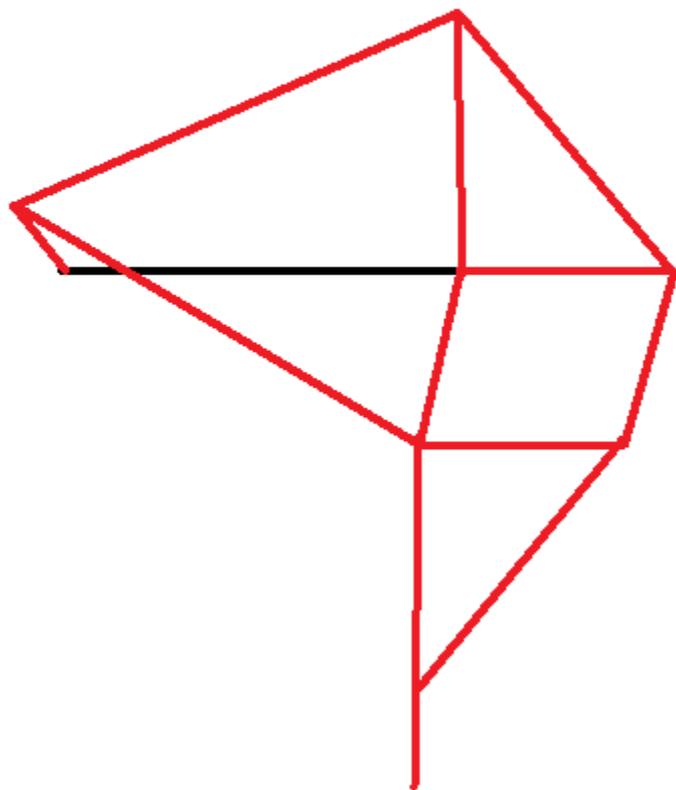


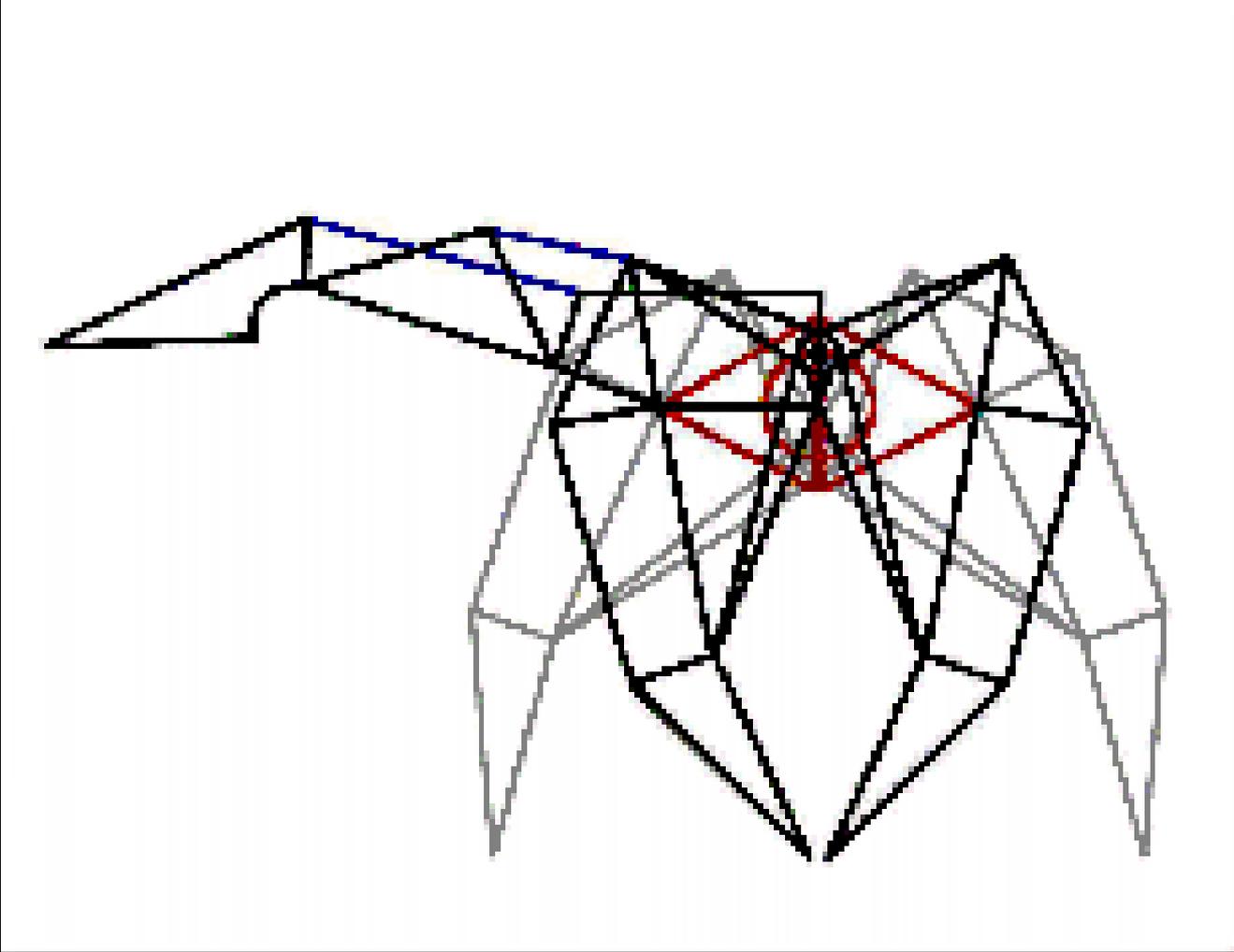






*"The inherited thrashing movements were copied and, mixed with mutations, distributed to a random subsequent generation of more than 200 creatures." - Theo Jansen.*





No creature on earth is better at pretending than we humans. The title of this book is a way of saying that our daily life is nothing other than a show played out in our minds. We have a talent for creating a fantasy world. Luckily for us, He who is unable to daydream becomes hopelessly depressed. Our talent for simulating is so strong that we are even able to pretend that we exist. We simulate a first-person form, an 'I'.

In *The Great Pretender*, kinetic artist Theo Jansen shows that the 'I' we envision is a tool in our evolution. We need this tool to be selfish. There can be no selfishness without the I-fantasy.

Since 1990 Theo Jansen has been engaged in creating new forms of life: beach animals. These are not made of protein like the existing life-forms but from another basic stuff, yellow plastic tubing. Skeletons made from these tubes are able to walk. They get their energy from the wind, so they don't have to eat like regular animals. They evolved over many generations, becoming increasingly adept at surviving storms and water from the sea. Theo Jansen's ultimate wish is to release herds of these animals on the shore. In redoing the Creation, so to speak, he hopes to become wiser in his dealings with the existing nature by encountering problems the Real Creator had to face.

*The Great Pretender* is a testimonial to his experiences as God. It's not easy being God; there are plenty of disappointments along the way. But on the few occasions that things work out, being God is the most wonderful thing in the world.

Includes a companion DVD of beach animal videos.



Theo Jansen

# The Great Pretender

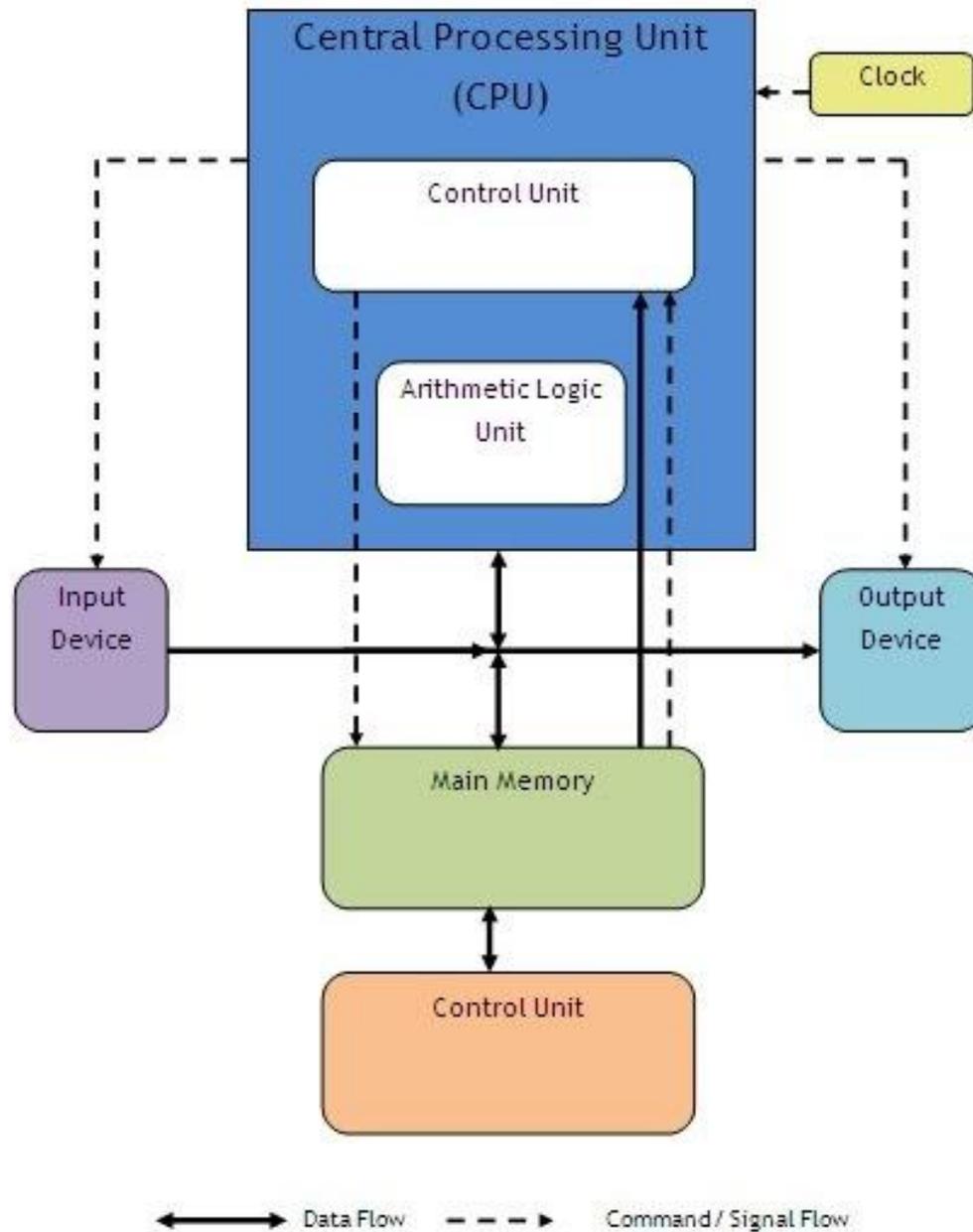
010 Publishers





And so...

## Components of the Von Neumann Model



## Bubble Growth Rules

See the Bubble.PopulateGrowthConditionCases() method

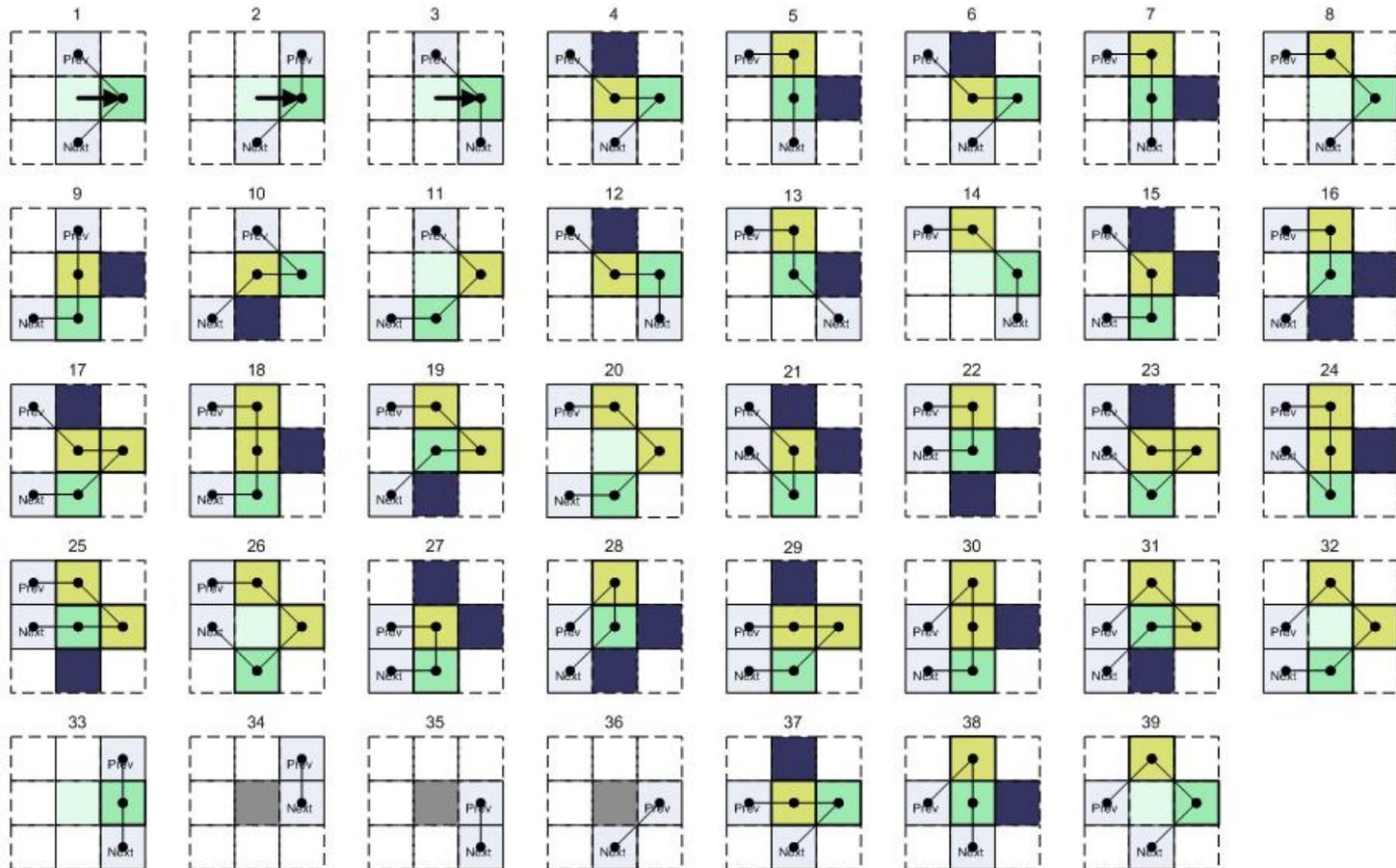
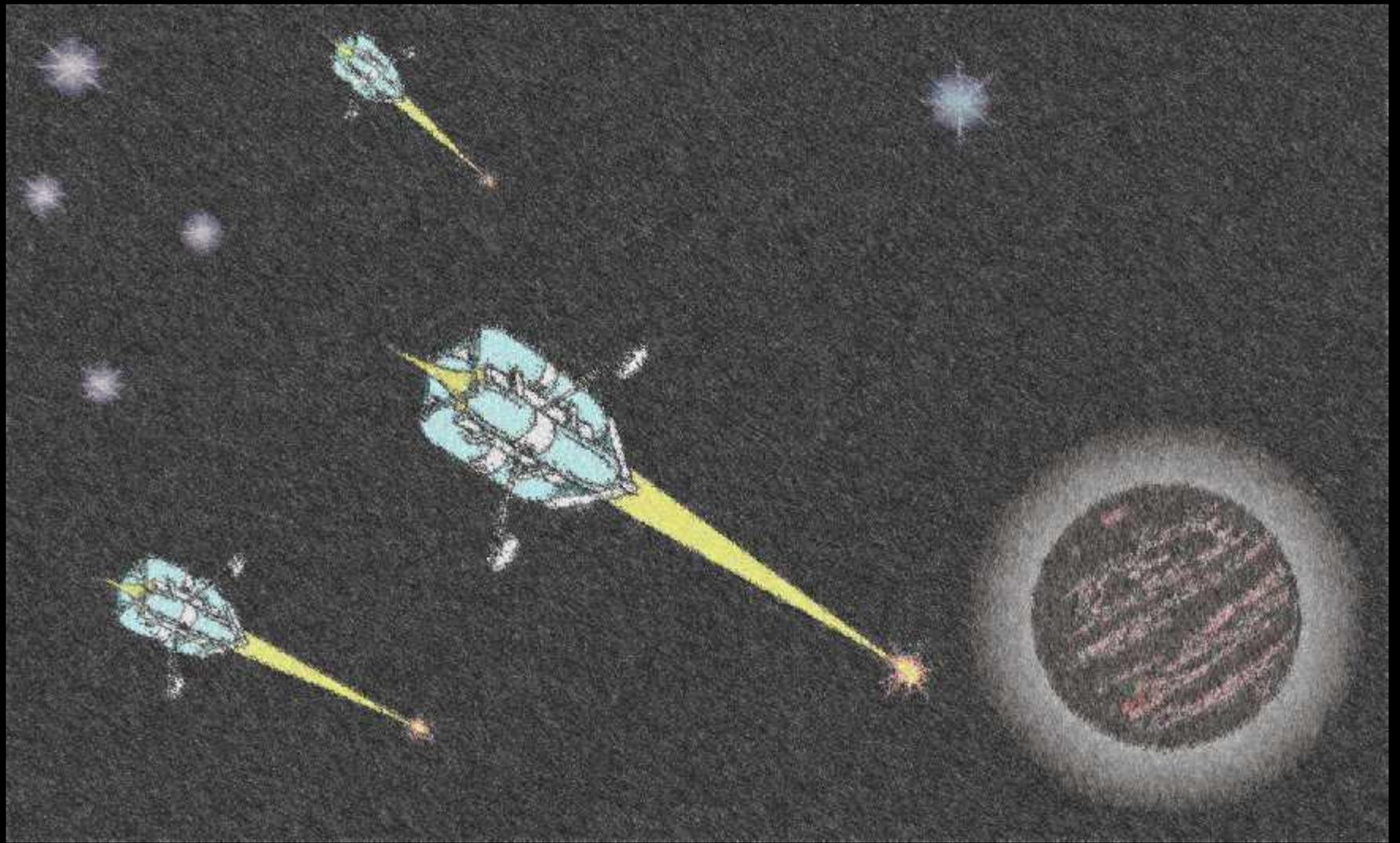
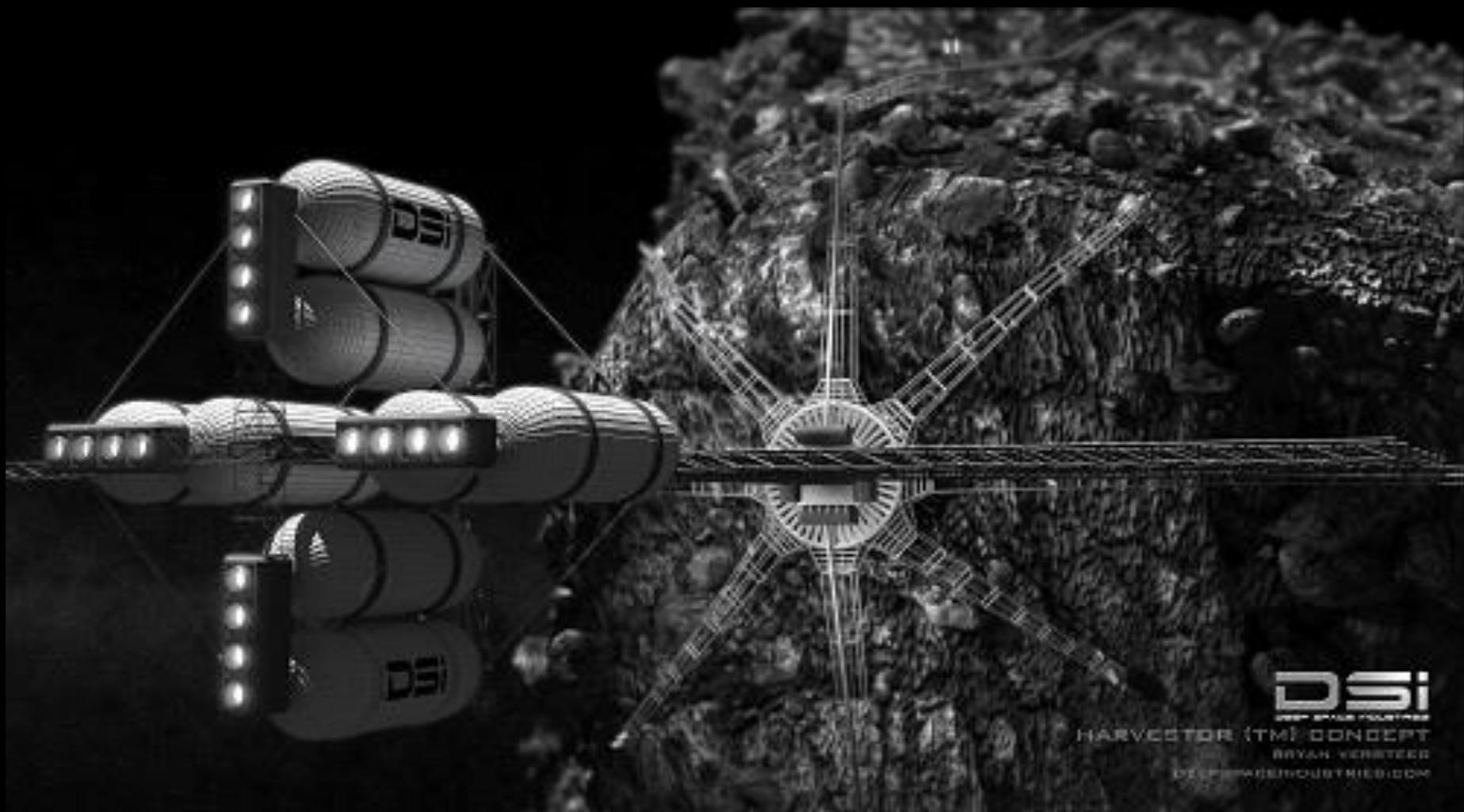


Figure 5: Cellular automaton growth rules





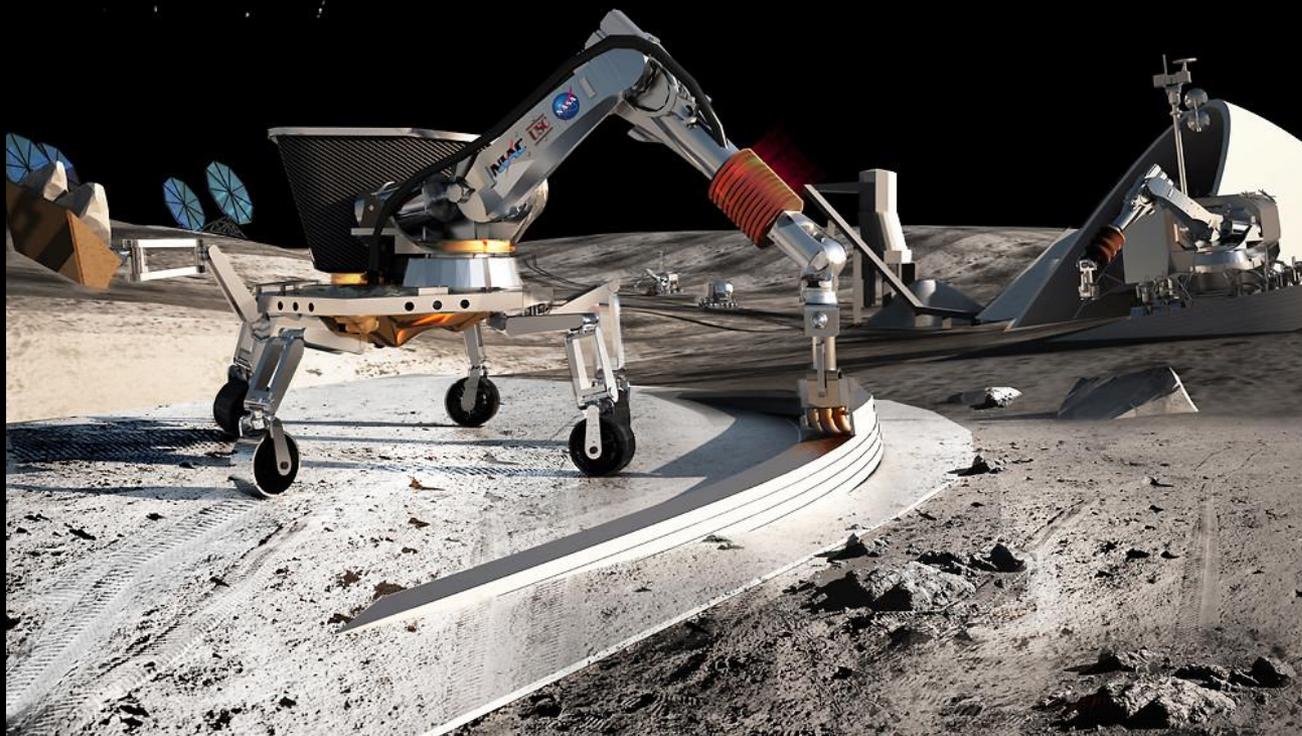


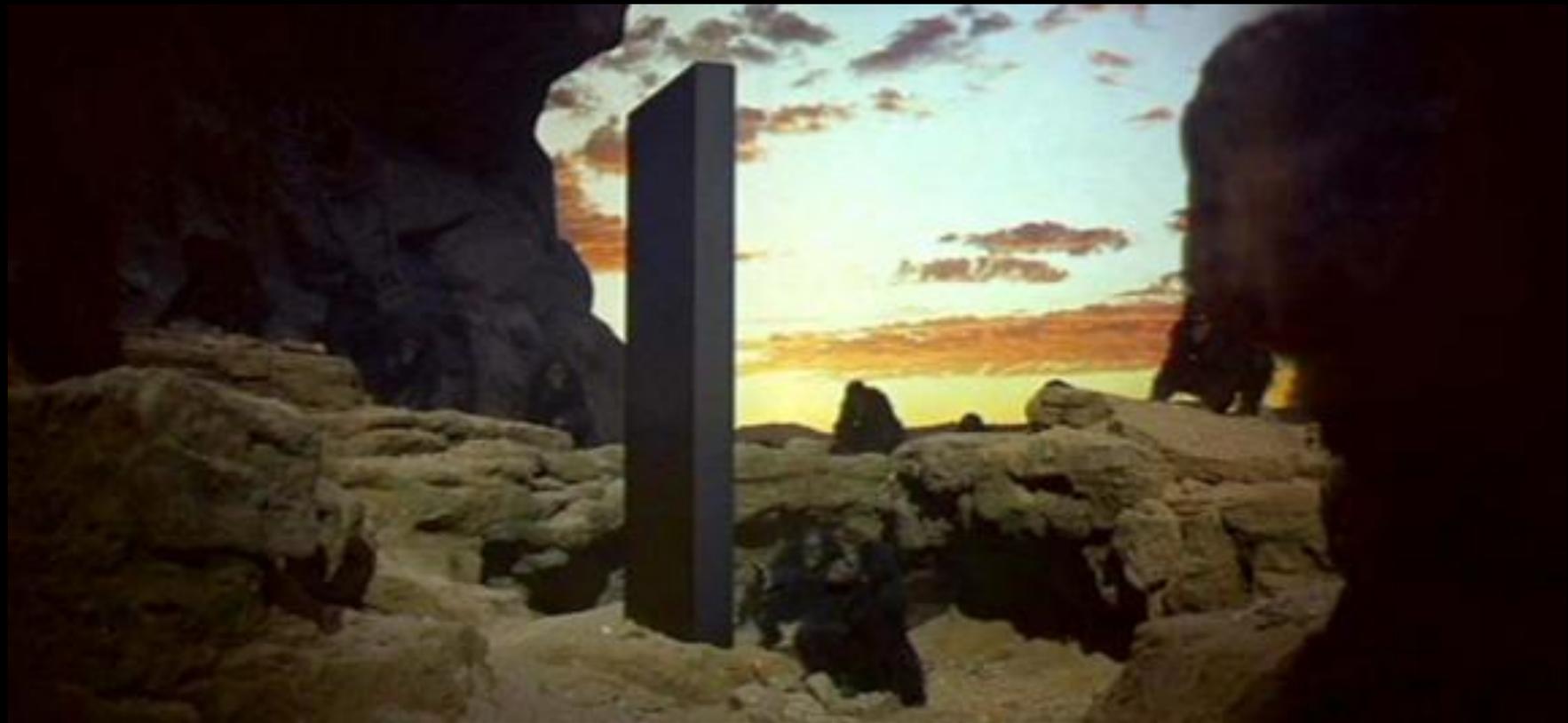
**DSi**  
DEEP SPACE INDUSTRIES

HARVESTER (TM) CONCEPT

BRYAN VERSTEEG

DESP@CEINDOUSTRIE.COM

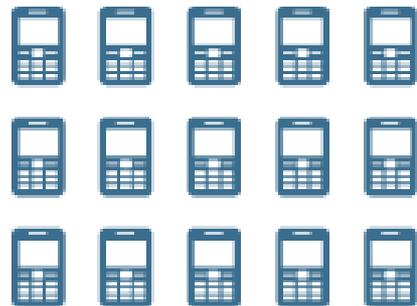






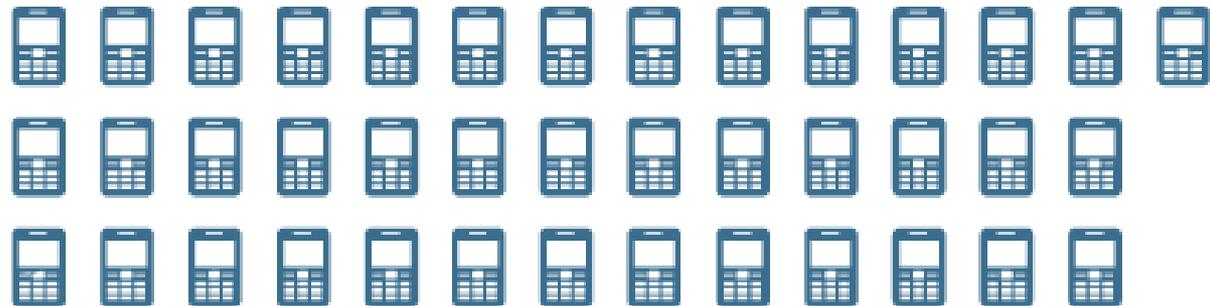
# 15B

CONNECTED  
DEVICES IN 2015



# 40B

CONNECTED  
DEVICES BY 2020



= 1B DEVICES

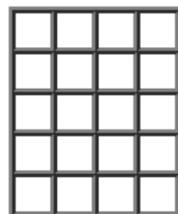
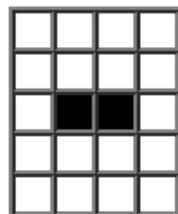
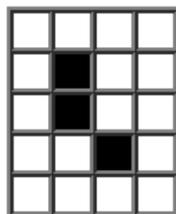
# moves

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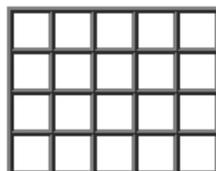
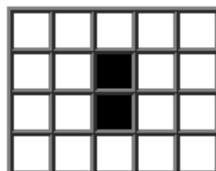
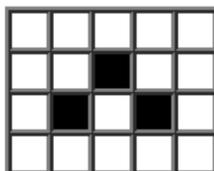
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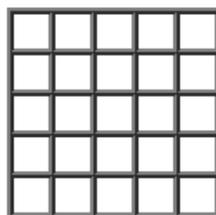
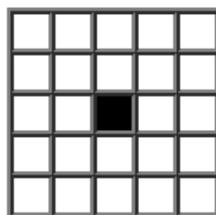
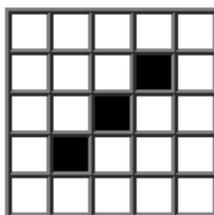
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b



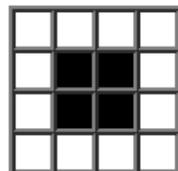
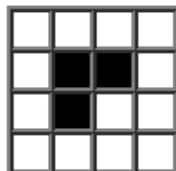
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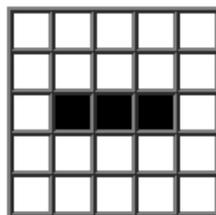
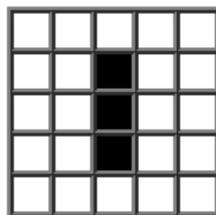
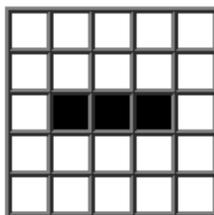
dies

d



block (stable)

e



blinker (period 2)

Grade: 0



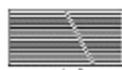
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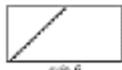
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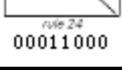
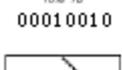
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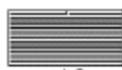
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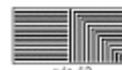
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00010011



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00011001

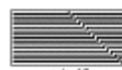


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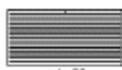


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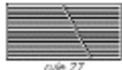
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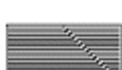
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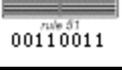
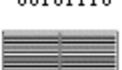
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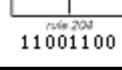
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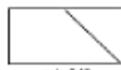


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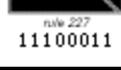
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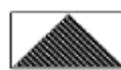
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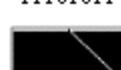
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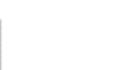
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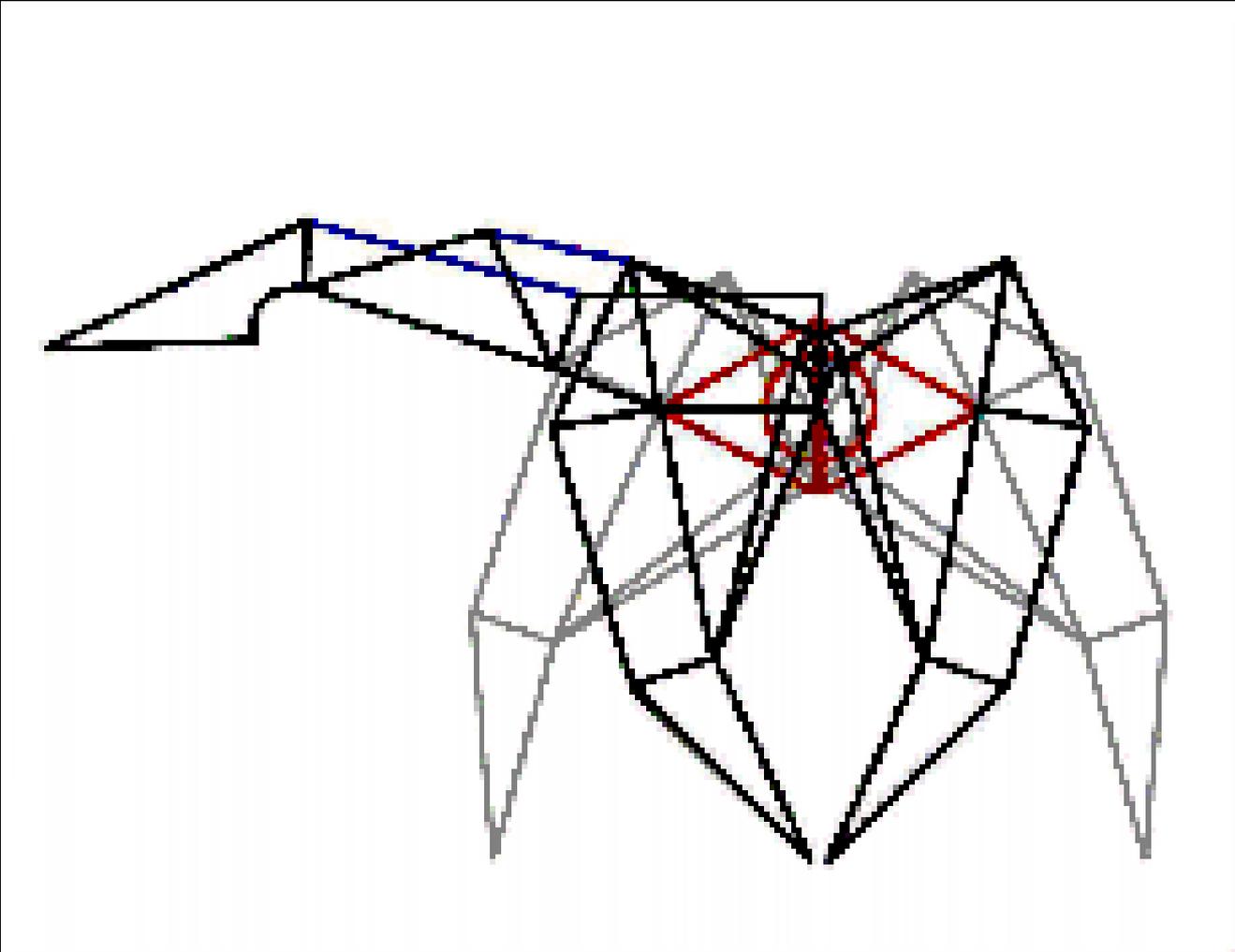
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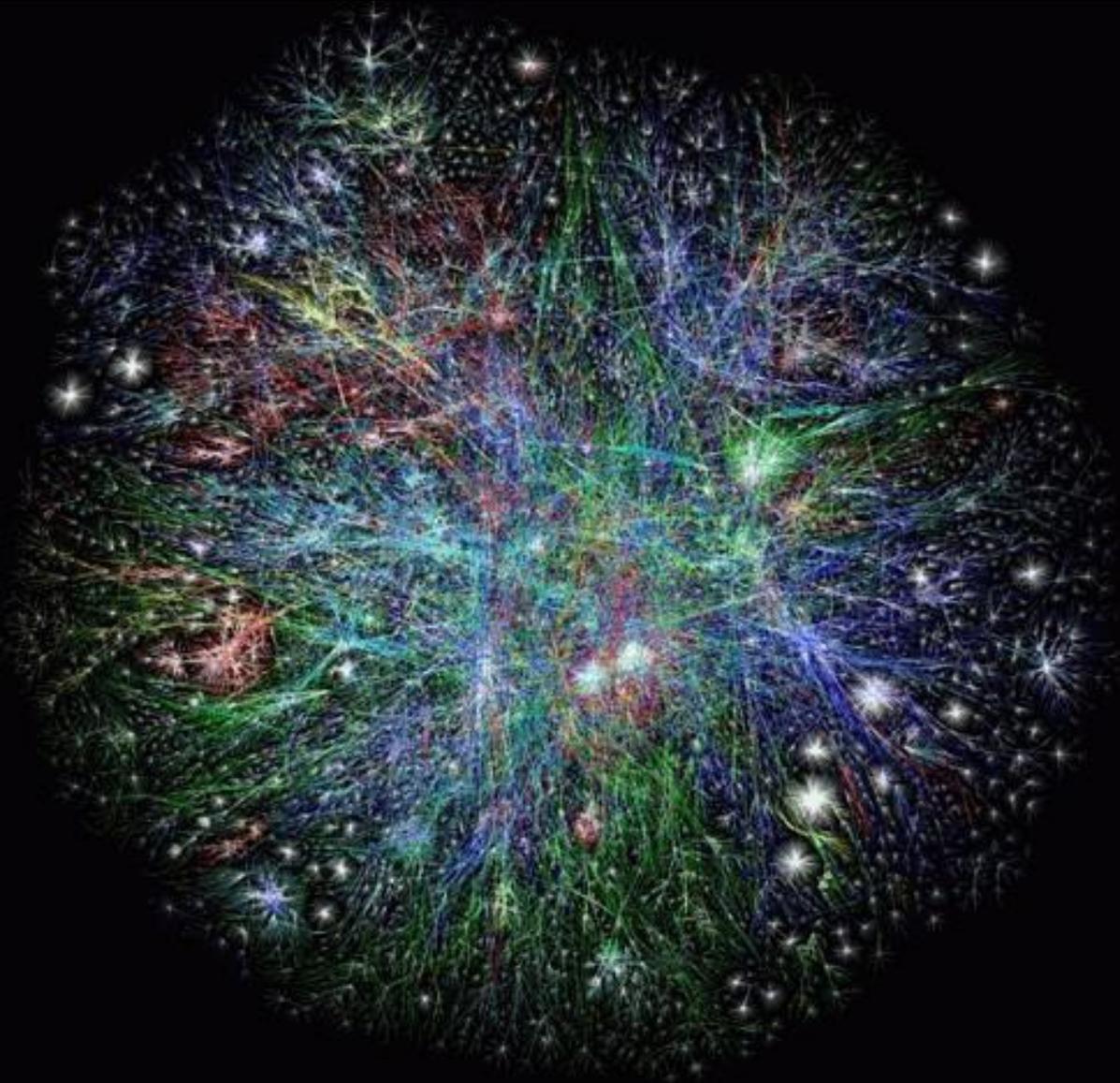


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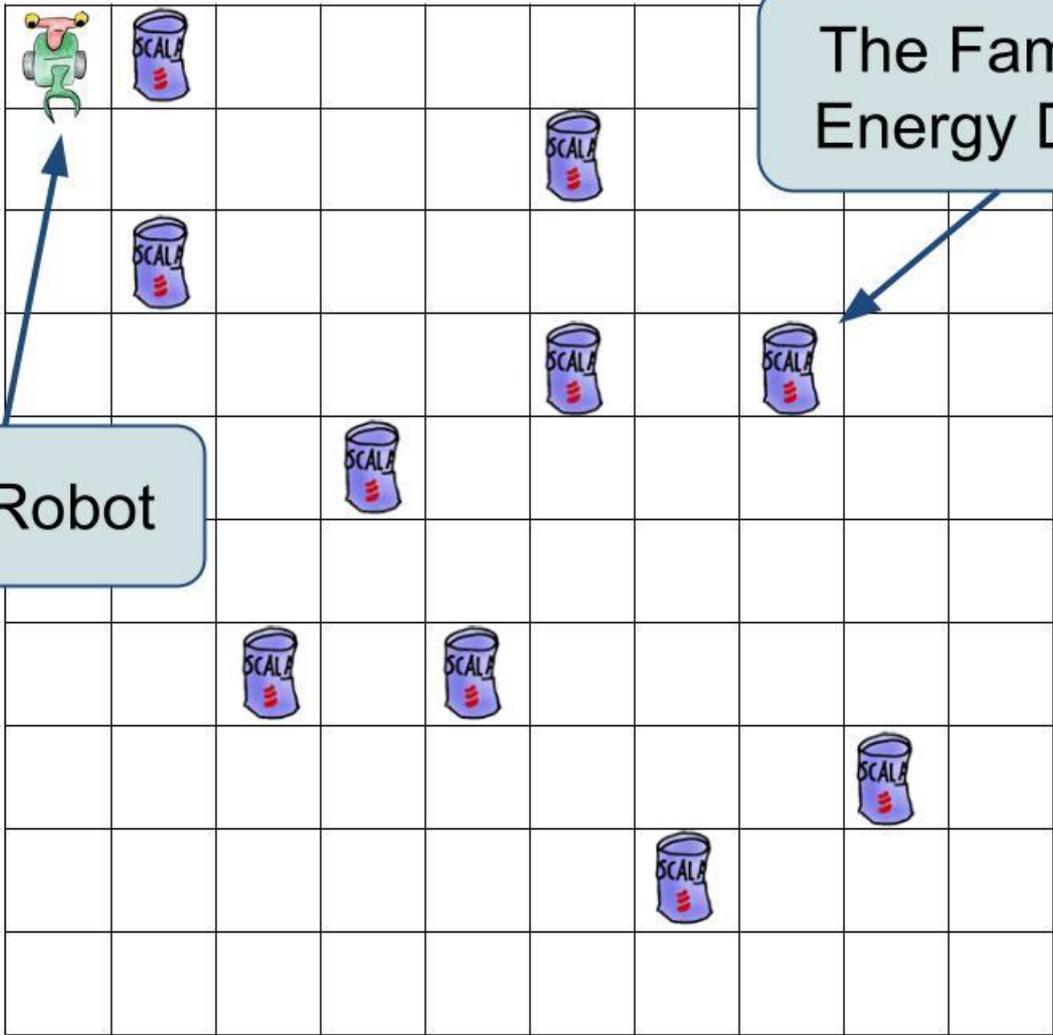


COMPLEXITY  
A GUIDED TOUR

MELANIE MITCHELL

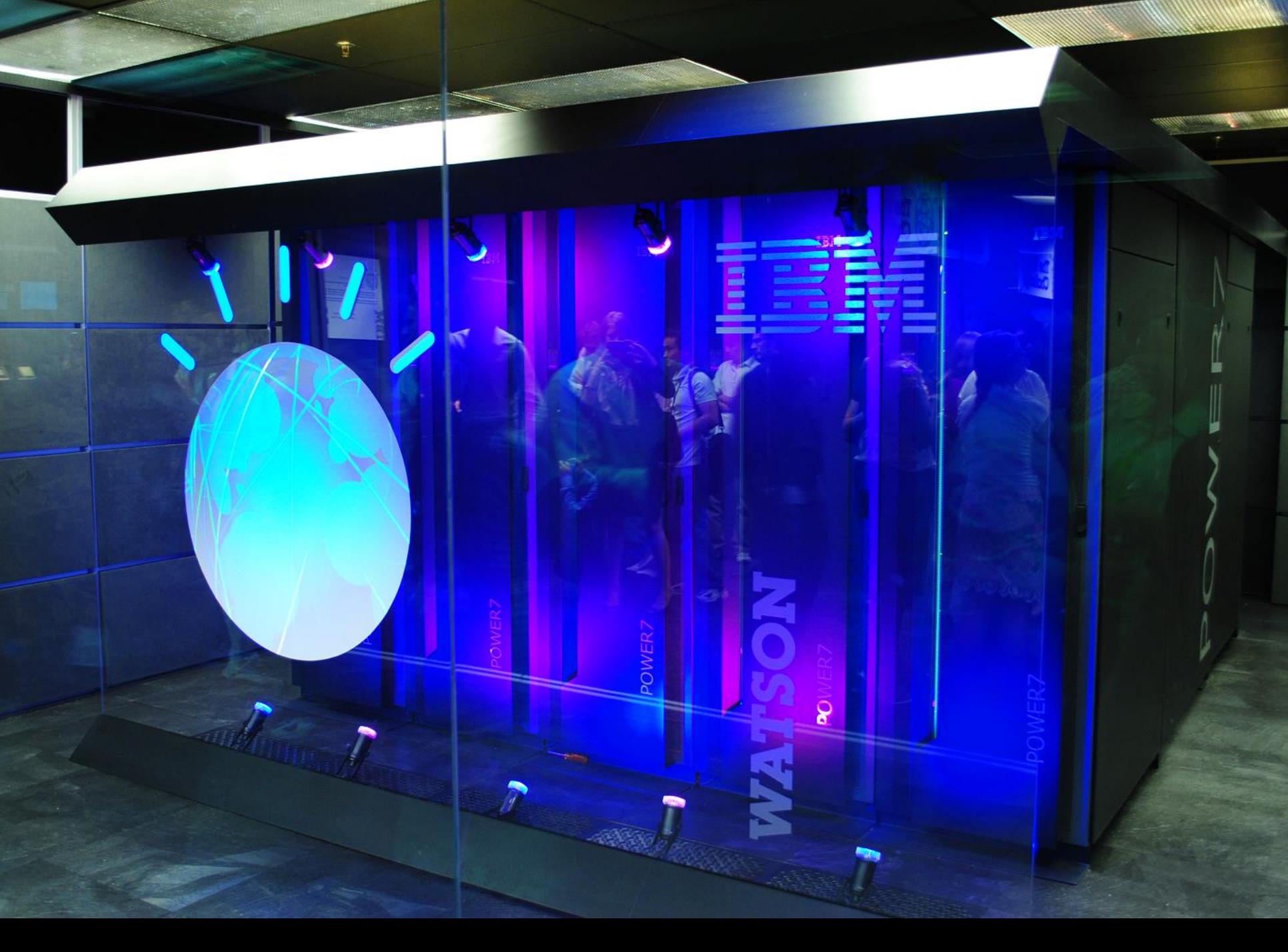
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The Robot

The Famous Energy Drink



POWER7

POWER7

WATSON

POWER7

POWER7

POWER7

*"As we gain more data, how much better does our system get? It's still improving—but we are getting to the point where we get less benefit than we did in the past." - Peter Norvig.*



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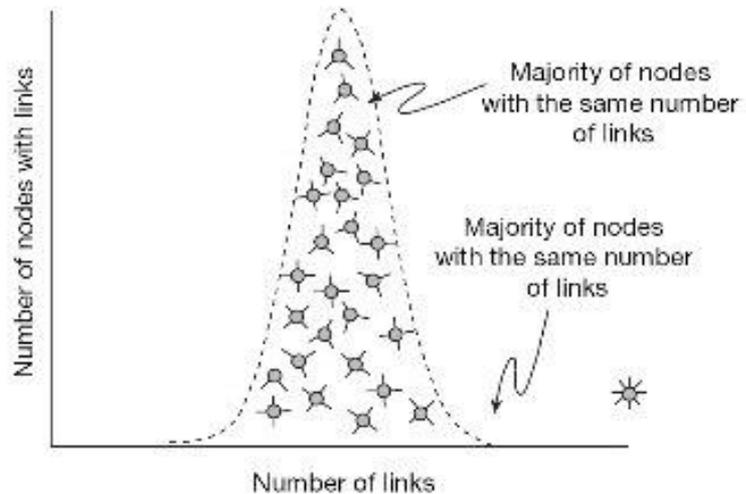
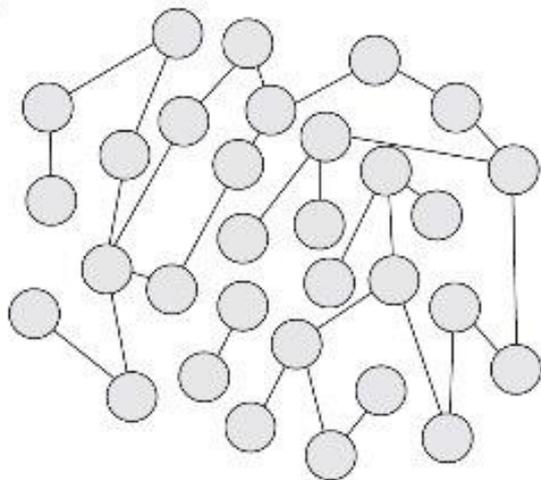
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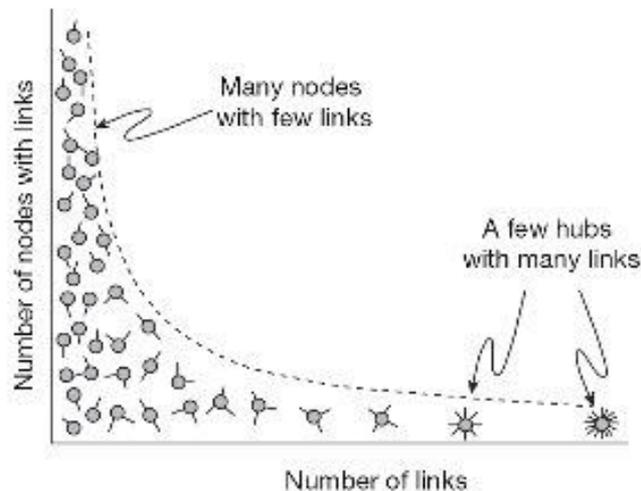
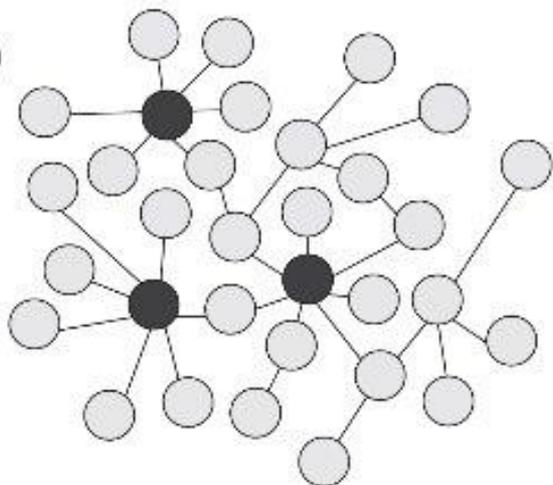
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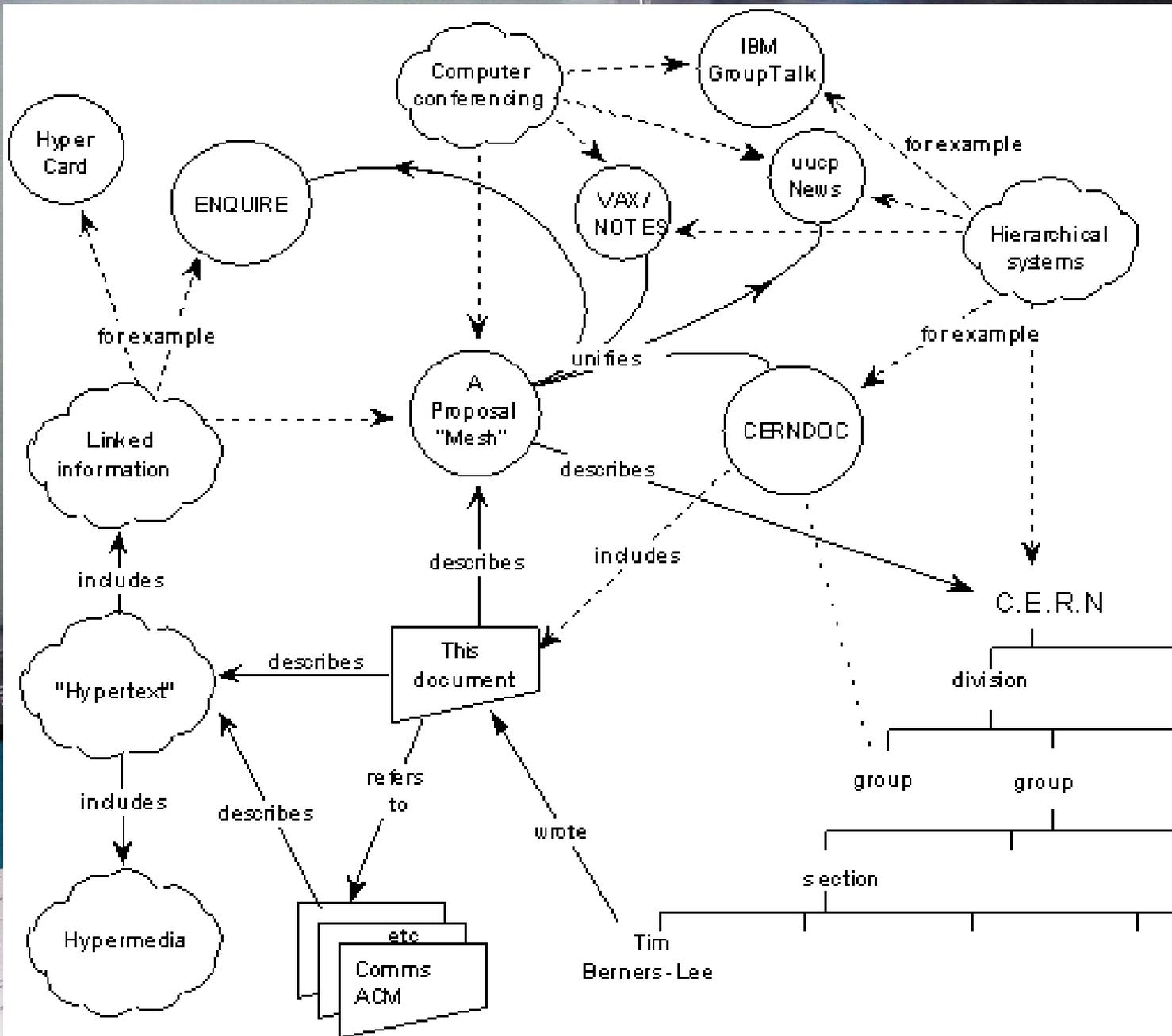
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Management: A Proposal  
 Abstract  
 Information about...  
 retrieval. Information...

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next the

**small**

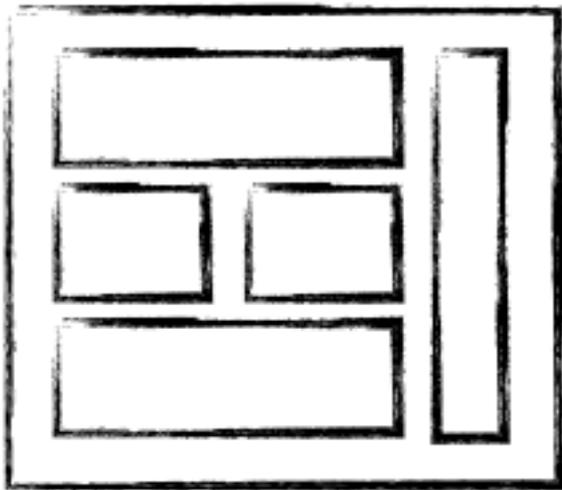
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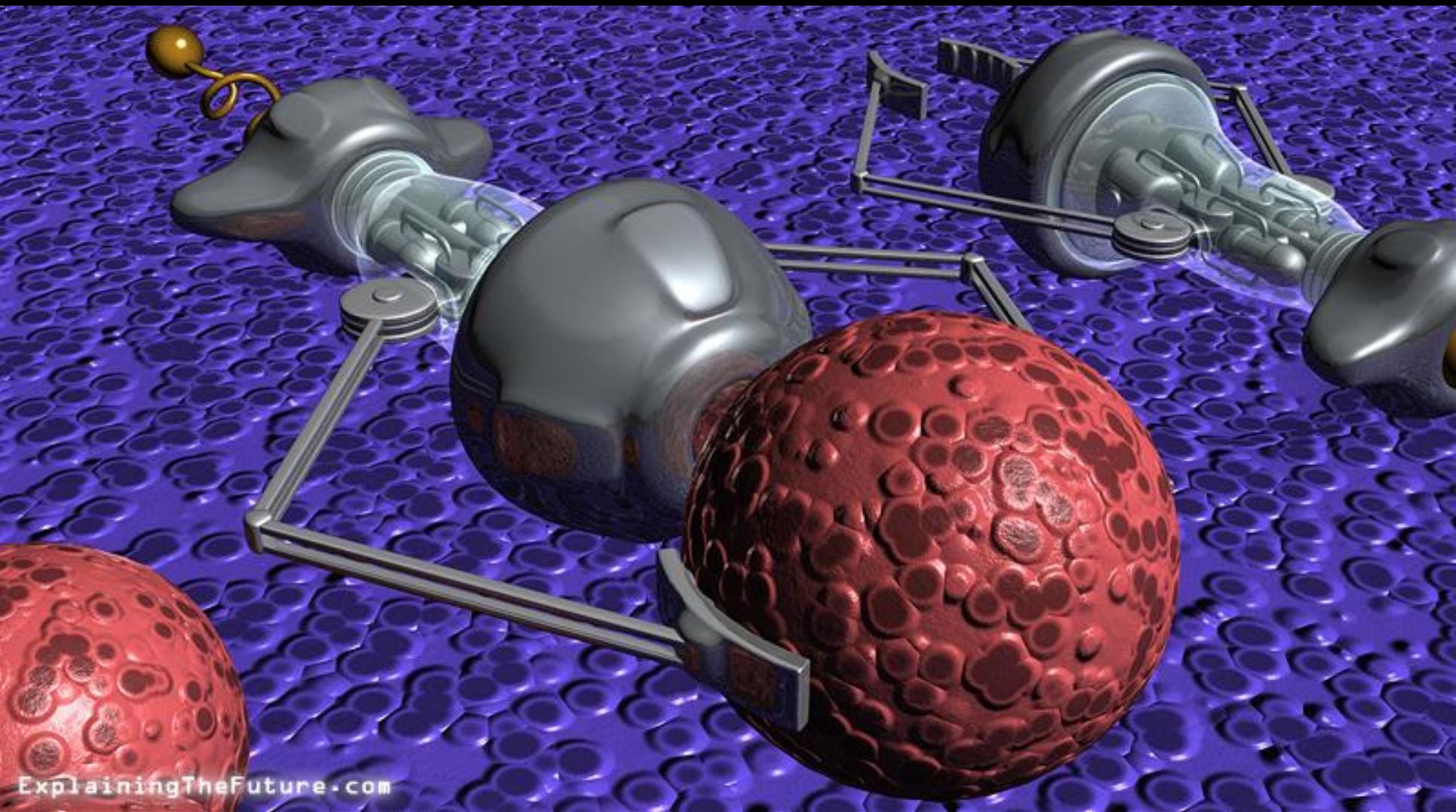


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MICRO SERVICES



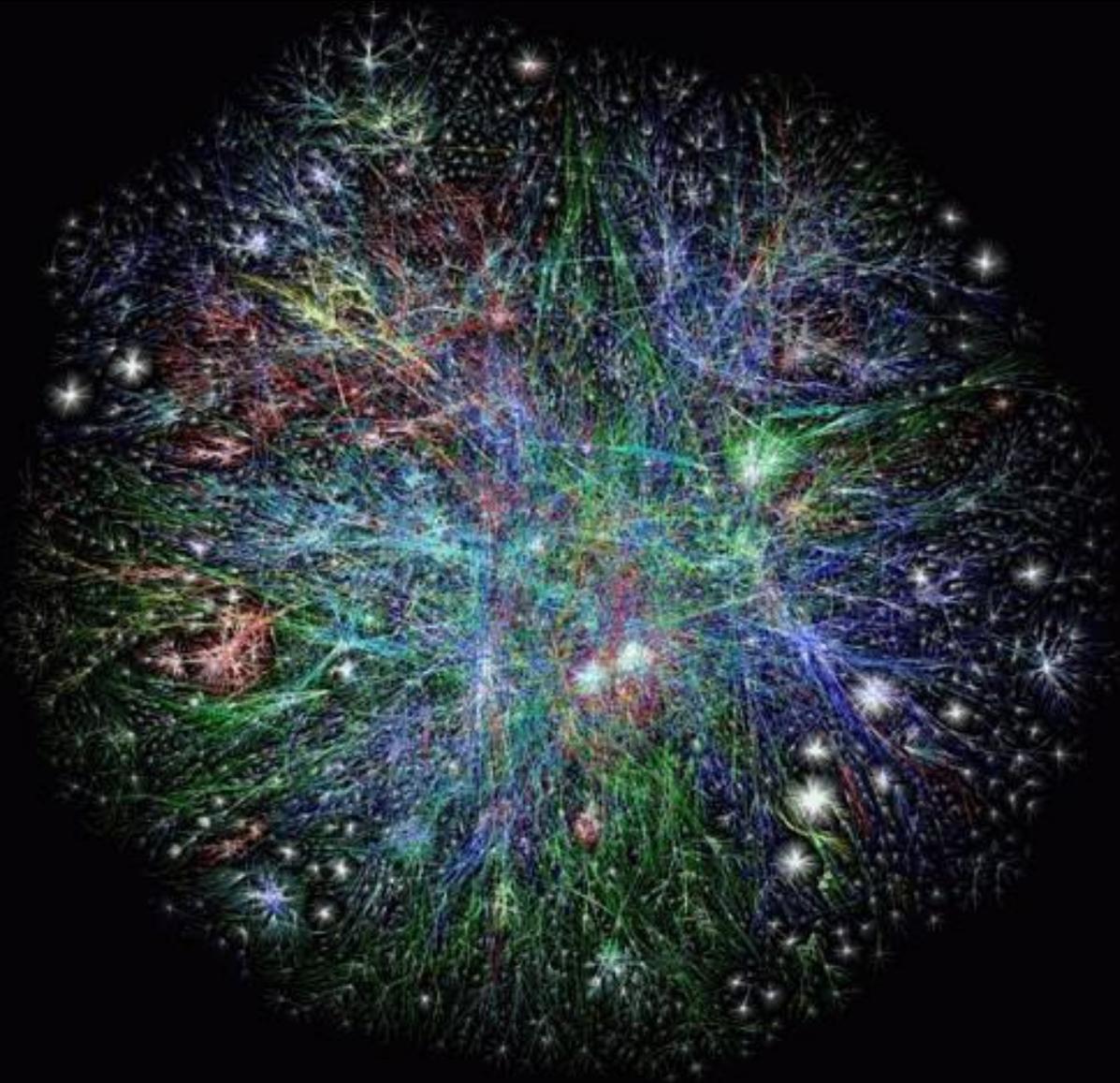


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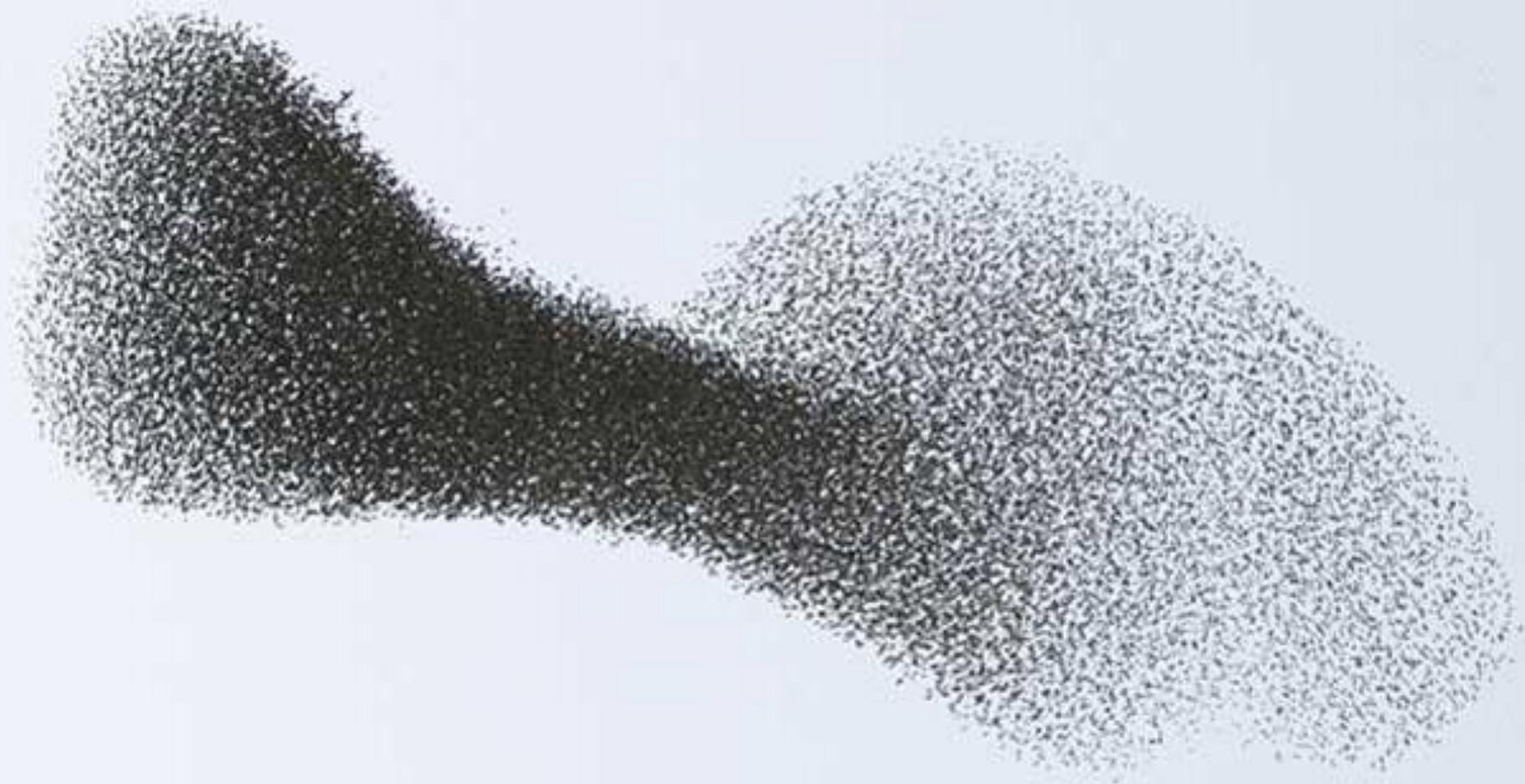
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*“The maze is a metaphor for hypermedia applications in general.” – Leonard Richardson.*



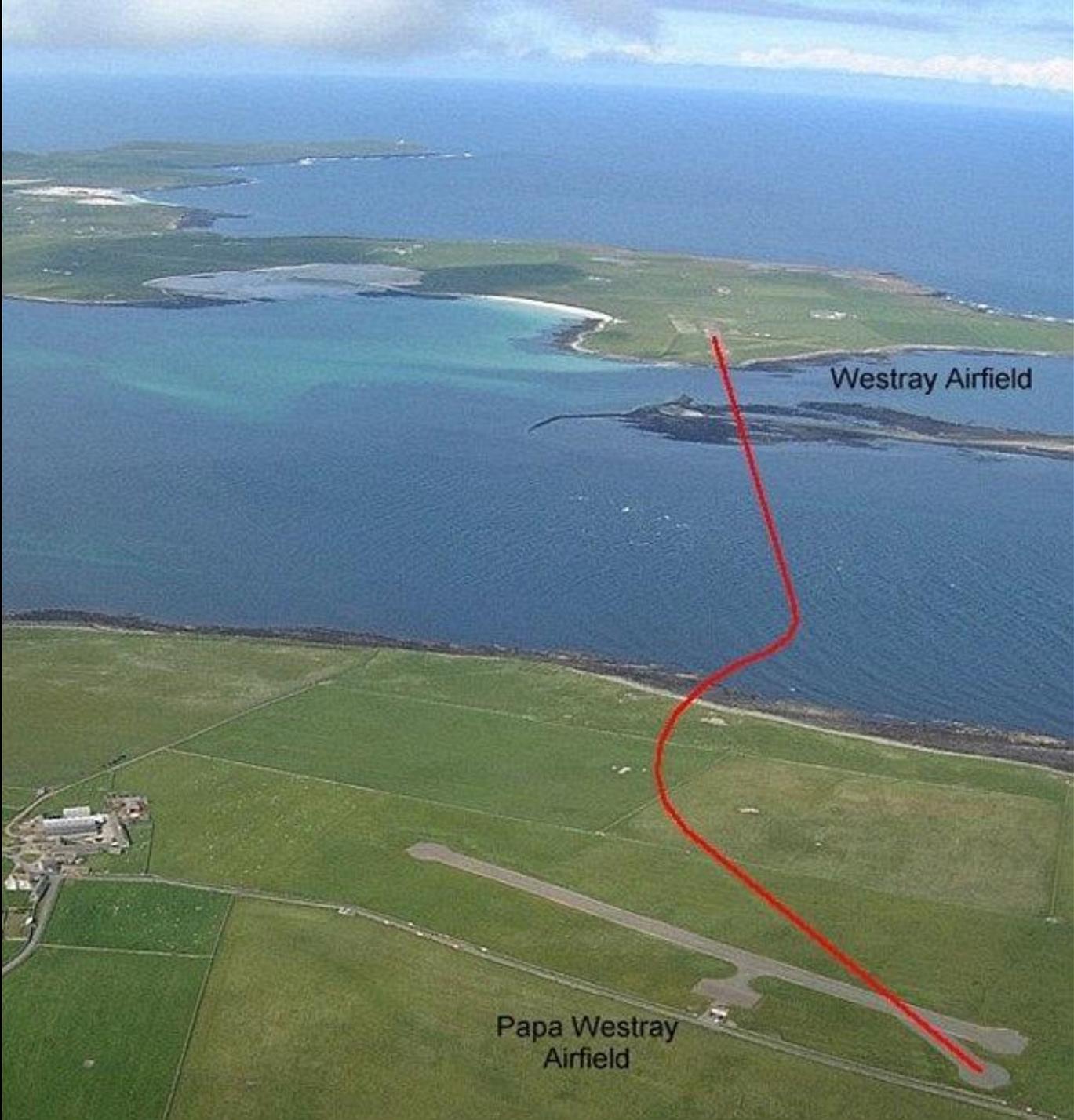
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19 m.rules = {
20     'east' : ['south', 'east', 'north', 'west'],
21     'south' : ['west', 'south', 'east', 'north'],
22     'west' : ['north', 'west', 'south', 'east'],
23     'north' : ['east', 'north', 'west', 'south']
24 };
25
```





```
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ute("eid")));)a=a.parentNode;return b||google.kEI},https:f
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ion(a,b,c,h,k){var d=
google.lc,e=google.li,g="";d.onerror=d.onload=d.onabort=funct
search("&ei=")||g+"&ei="+google.getEI(h);c=c||"/"+(k||"gen_
&zx="+google.time());a=/^http:/i;a.test(c)&&google.https()?C
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a+1++},function(){google.load(a,b,c)}}};var l=0;
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e.searchBox.value);google.x({id:"psyapi"},function(a){return
arch({q:a,sourceid:"chrome-psyapi2"},!1,!0)}}}
chrome.searchBox.onsubmit=m;})();
function(a){a.href=document.getElementById(a.id.substring(1))
var h=this,l>Date.now||function(){return+new Date};var u=
||(a=window.event);return b.call(c,a)},v="undefined"!=type
t(navigator.userAgent) w="undefined"!=typeof navigator&&l/c
```

```
19 m.rules = {
20     'east' : ['south', 'east', 'north', 'west'],
21     'south' : ['west', 'south', 'east', 'north'],
22     'west' : ['north', 'west', 'south', 'east'],
23     'north' : ['east', 'north', 'west', 'south']
24 };
25
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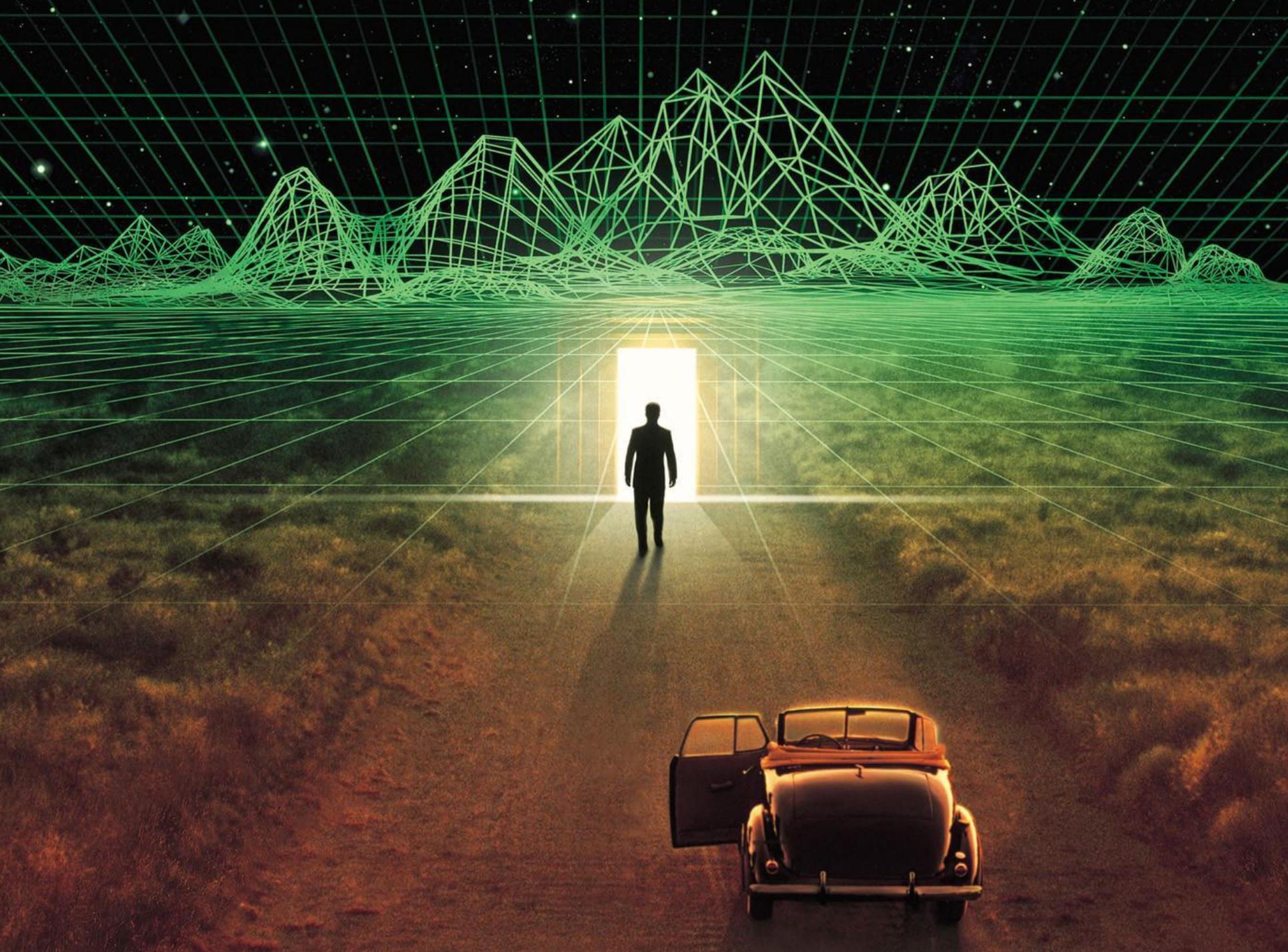
Westray Airfield

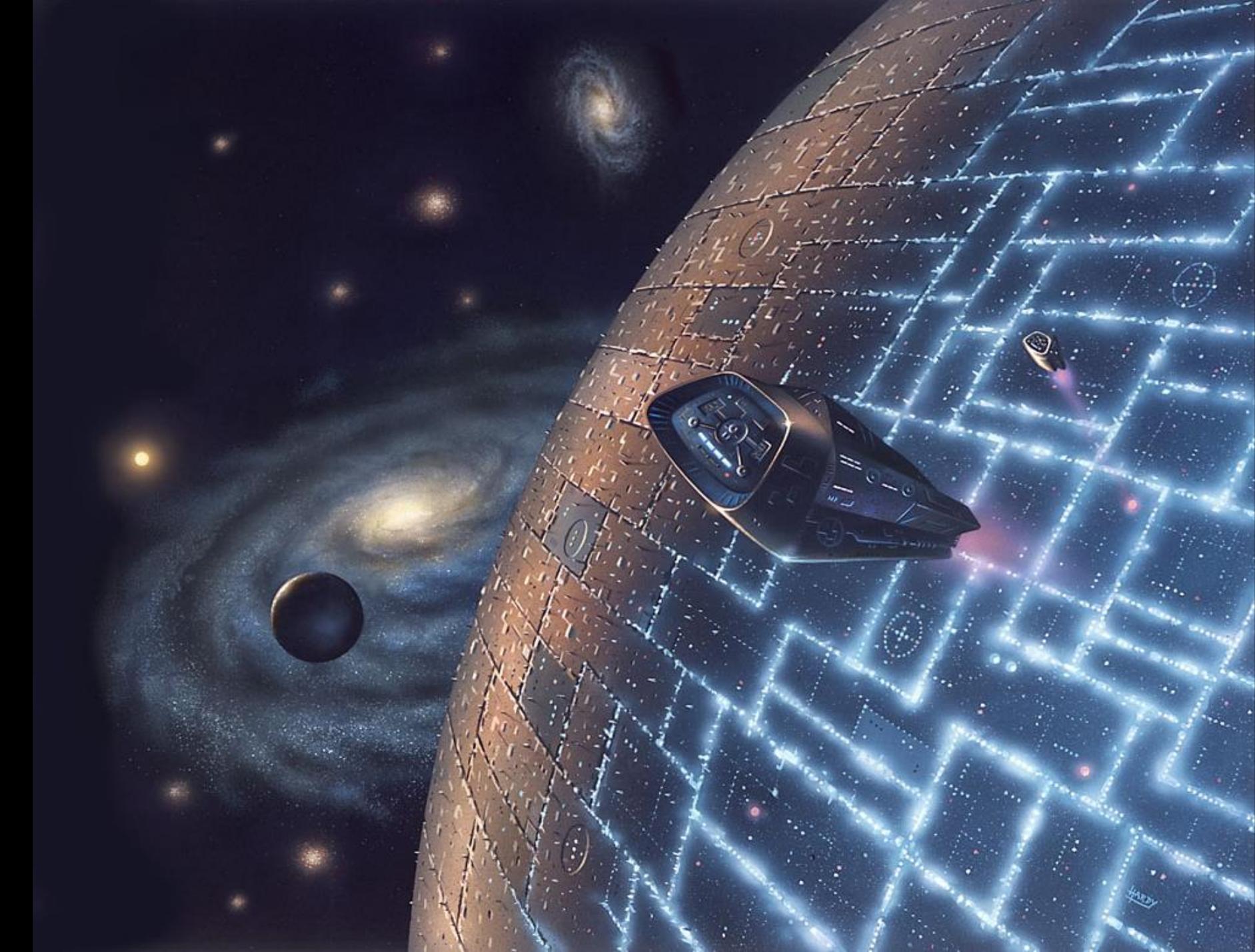
Papa Westray  
Airfield



*"A journey of a thousand miles begins  
with a single step." - Lao-tzu*







HARRY

# Self-Replication, Strandbeest, and the Game of Life.

*What John von Neumann, Theo Jansen,  
and John Conway  
can tell us about scaling the  
API Economy.*

<http://g.mamund.com/apistrat2014-talk>

Mike Amundsen  
Director of Architecture,  
API Academy – CA Technologies  
@mamund