

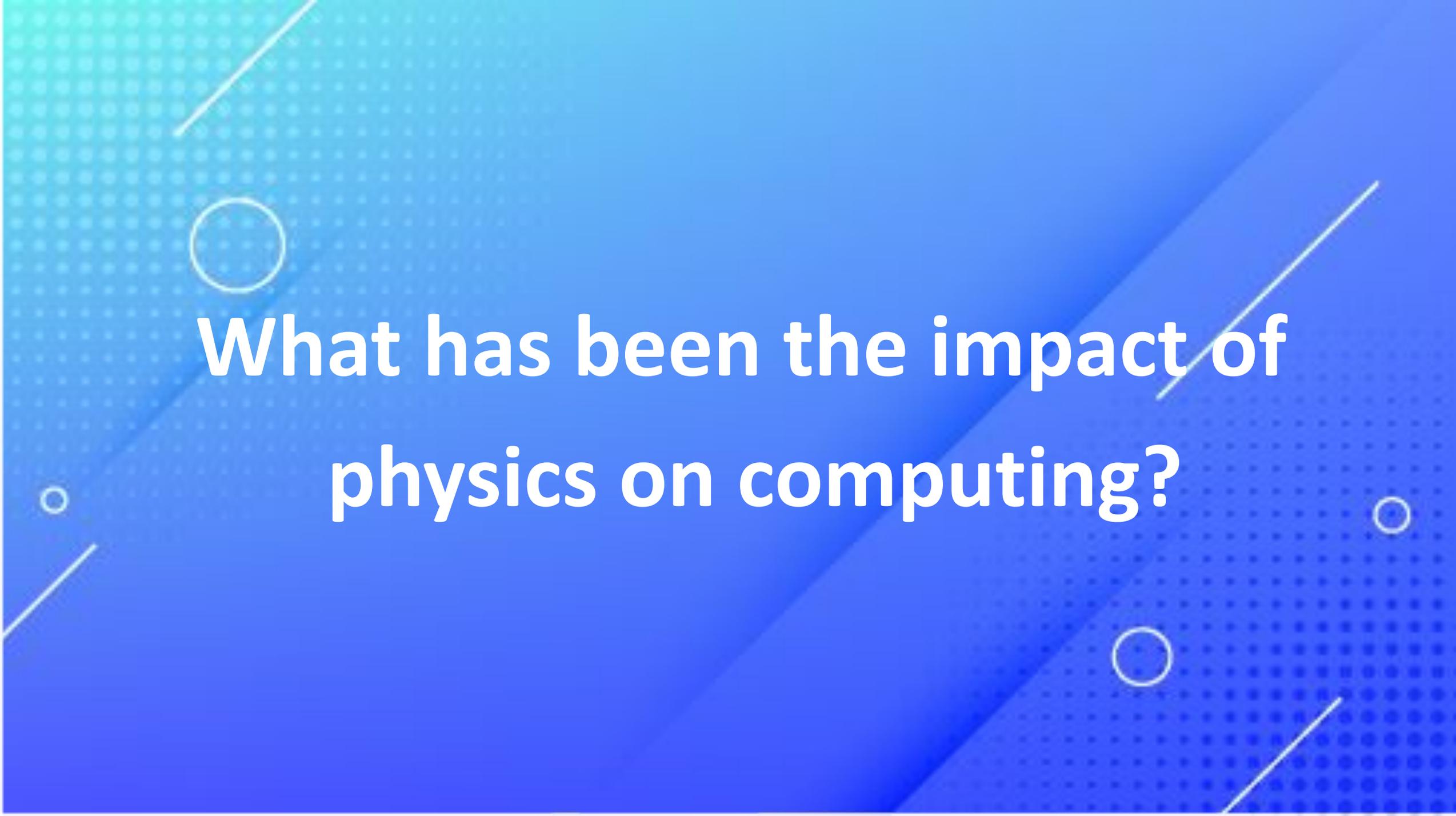


Strengthening Software: Have We Shifted Too Far Right?

Dr. Edward Amoroso

Chief Executive Officer, TAG Infosphere, Inc.

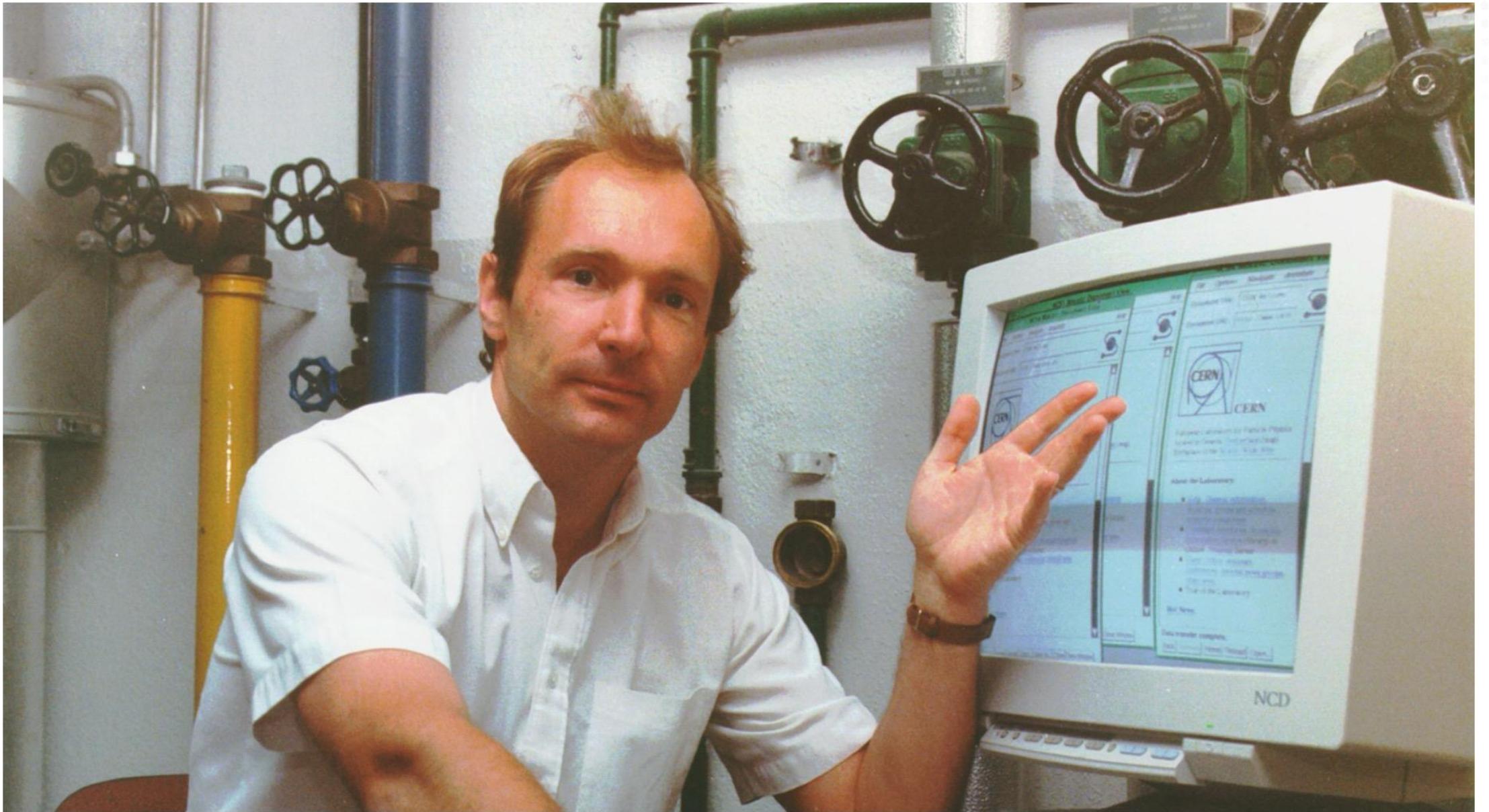
Research Professor, NYU

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**What has been the impact of
physics on computing?**







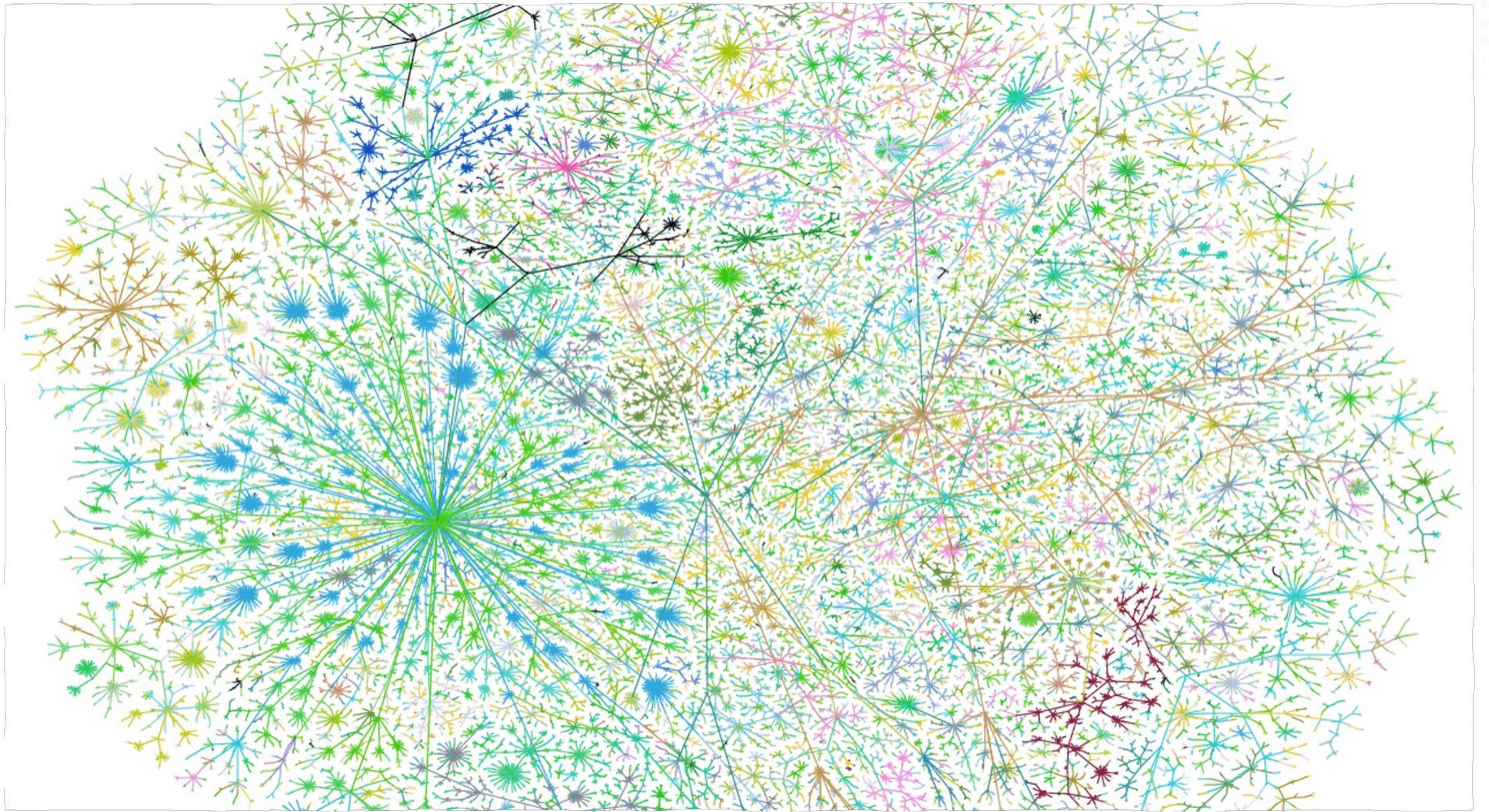


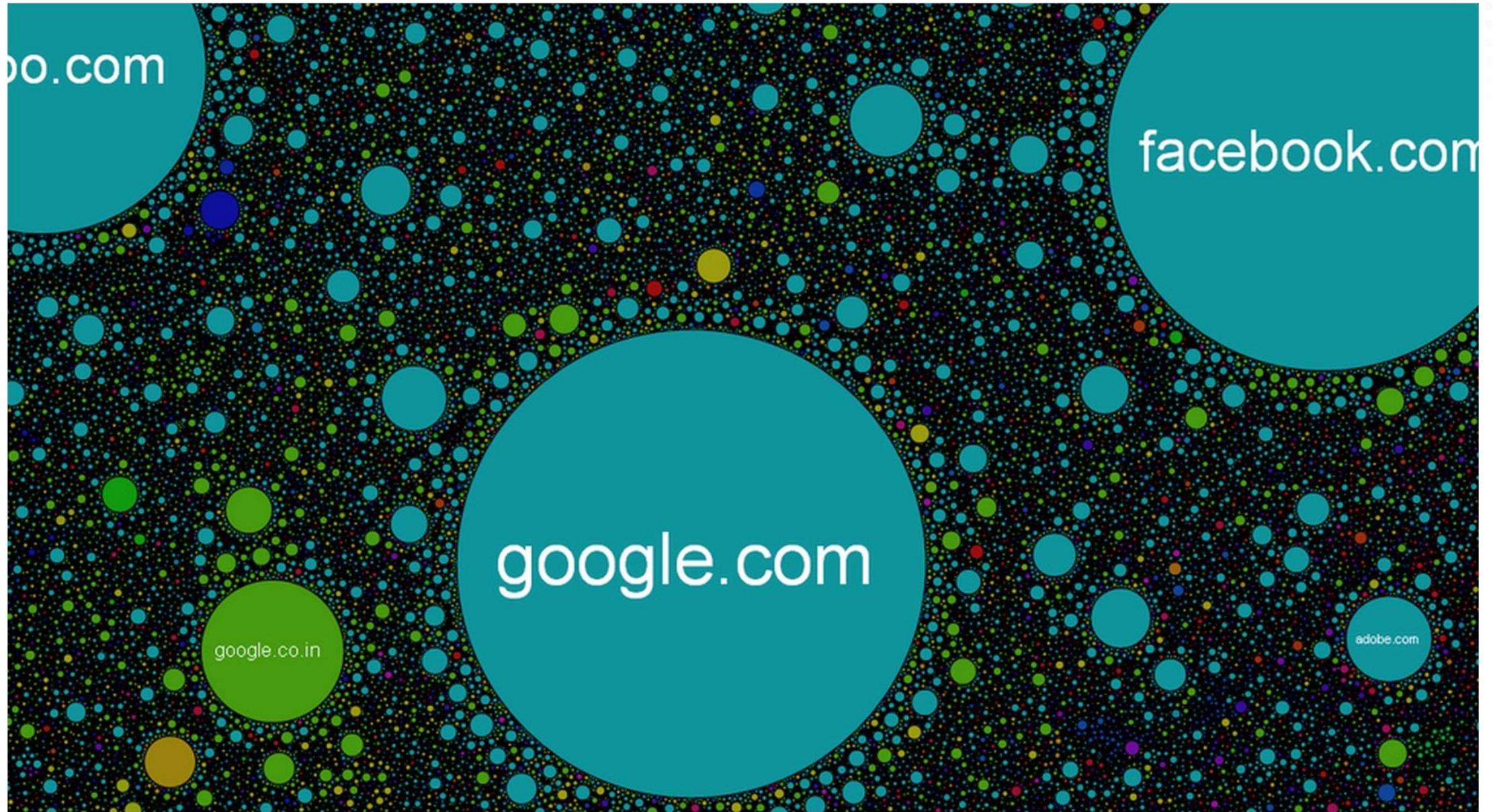
CLIFFORD STOLL
COMPUTER ASTRONOMER, HARVARD

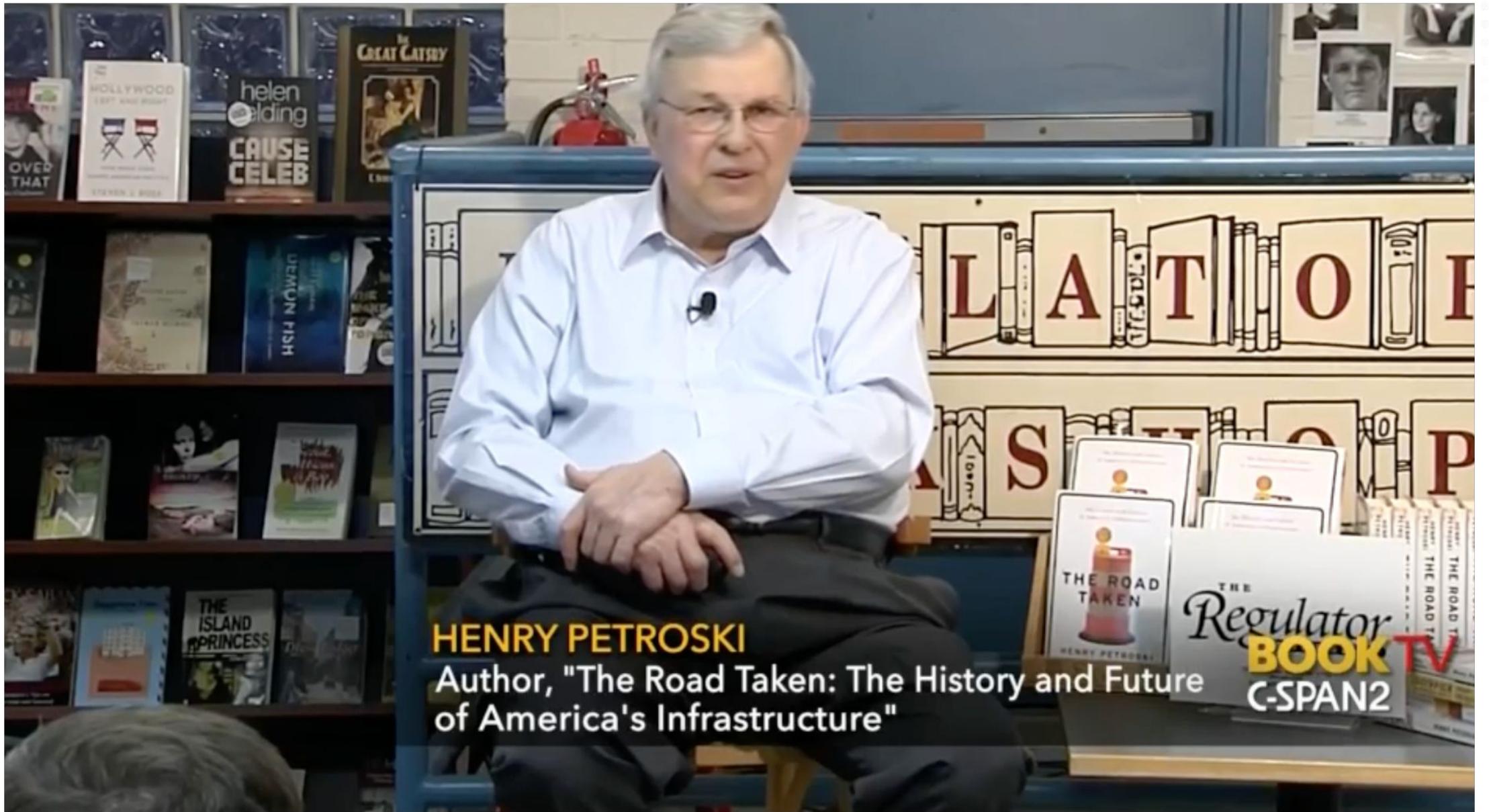


**What is the impact of engineering
on computing?**





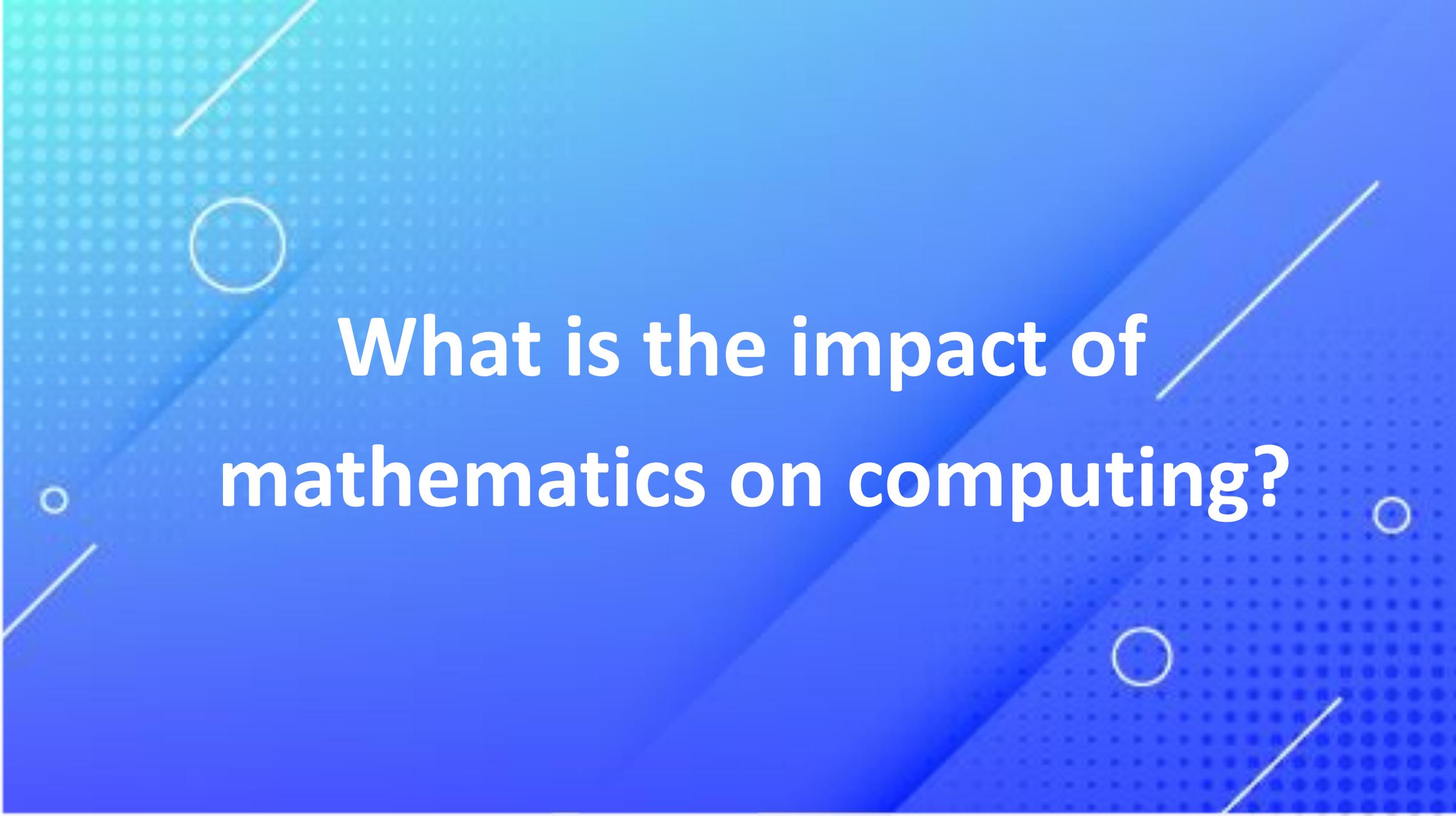




HENRY PETROSKI

Author, "The Road Taken: The History and Future of America's Infrastructure"



The background is a vibrant blue gradient with a pattern of small white dots in the top-left and bottom-right corners. Diagonal white lines and circles are scattered across the image, creating a modern, geometric aesthetic.

**What is the impact of
mathematics on computing?**





THE SCIENCE OF PROGRAMMING

David Gries



Springer

$$P2: 5 \leq n = |s| \leq 36 \wedge \\ c[i] = s[i-4] \cdot 2^4 + s[i-3] \cdot 2^3 + s[i-2] \cdot 2^2 + s[i-1] \cdot 2 + s[i] \\ (\text{for } 4 \leq i < n)$$

Further, in order to keep track of which 5-bit subsequences s contains, we use a Boolean array $in[0:31]$:

$$P3: (\forall i: 0 \leq i < 32: in[i] = (i \in c[4:n-1]))$$

With this introduction, the program should be easy to follow.

```

n, c[4], in[0]:= 5, 0, T;
in[1:31]:= F; {s=(0,0,0,0,0)}
{inv: P1 ^ P2 ^ P3 ^ ¬good(s | 0)}
do c[4] ≠ 1 -
  if n = 36 → Print sequence s
  [] n ≠ 36 → skip
fi;
Change s to next higher good sequence:
do in[(c[n-1]*2+1) mod 32] {(i.e. ¬good(s | 1)}
  → Delete ending 1's from s:
  do odd(c[n-1]) - n:= n-1; in[c[n]]:= F od;
  Delete ending 0:
  n:= n-1; in[c[n]]:= F
od;
Append 1 to s:
c[n]:= (c[n-1]*2+1) mod 32; in[c[n]]:= T; n:= n+1
od
    
```

7. The result assertion is

$$R: c = (N i: 0 \leq i < F: f[i] \notin g[0:G-1]) + \\ (N j: 0 \leq j < G: g[j] \notin f[0:F-1])$$

We would expect to write a program that sequences up the two arrays together, in some synchronized fashion, performing a count as it goes. Thus, it makes sense to develop an invariant by replacing the two constants F and G of R as follows:

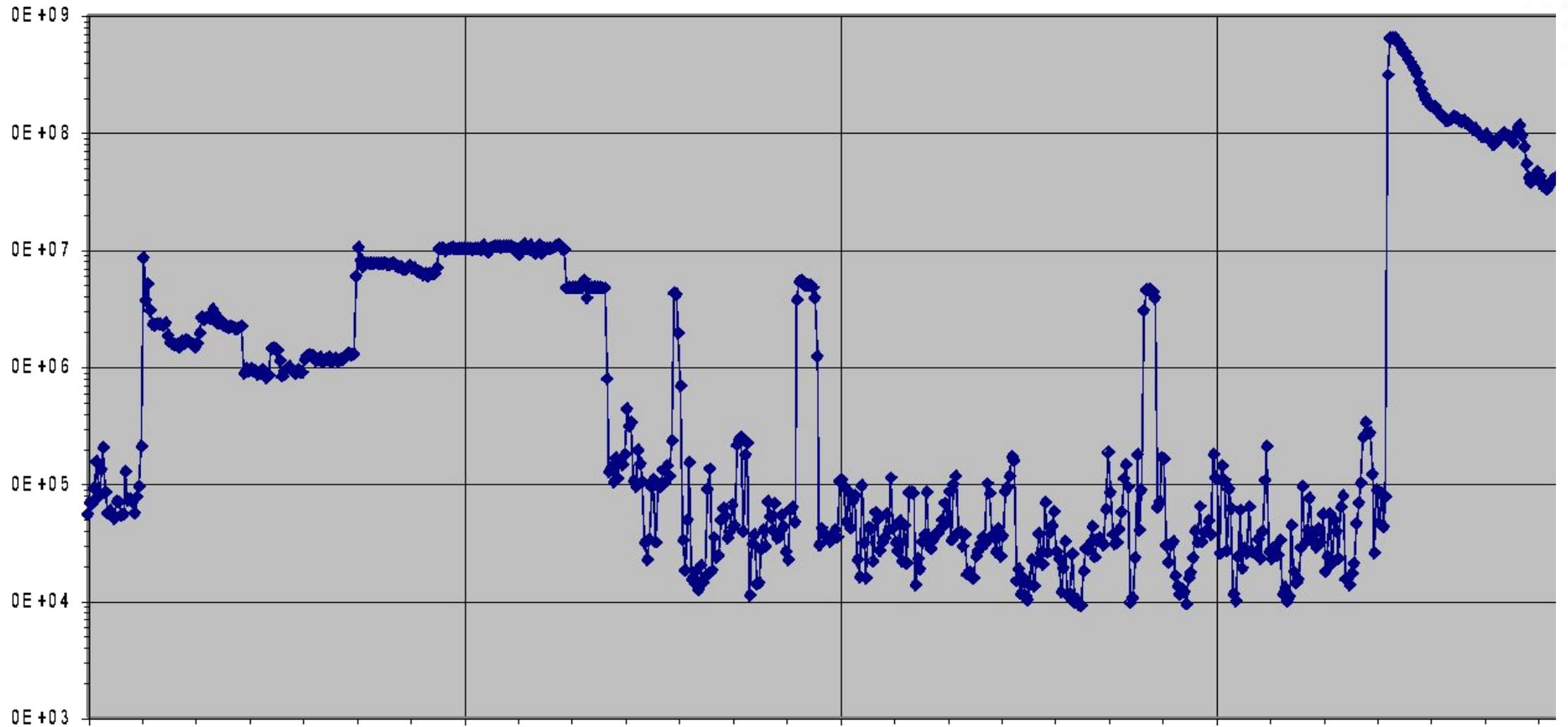
$$0 \leq h \leq F \wedge 0 \leq k \leq G \wedge \\ c = (N i: 0 \leq i < h: f[i] \notin g[0:G-1]) + \\ (N j: 0 \leq j < k: g[j] \notin f[0:F-1])$$

Now, consider execution of $h := h + 1$. Under what conditions does its execution leave P true? The guard for this command must obviously imply $f[h] \notin g[0:G-1]$, but we want the guard to be simple. As it



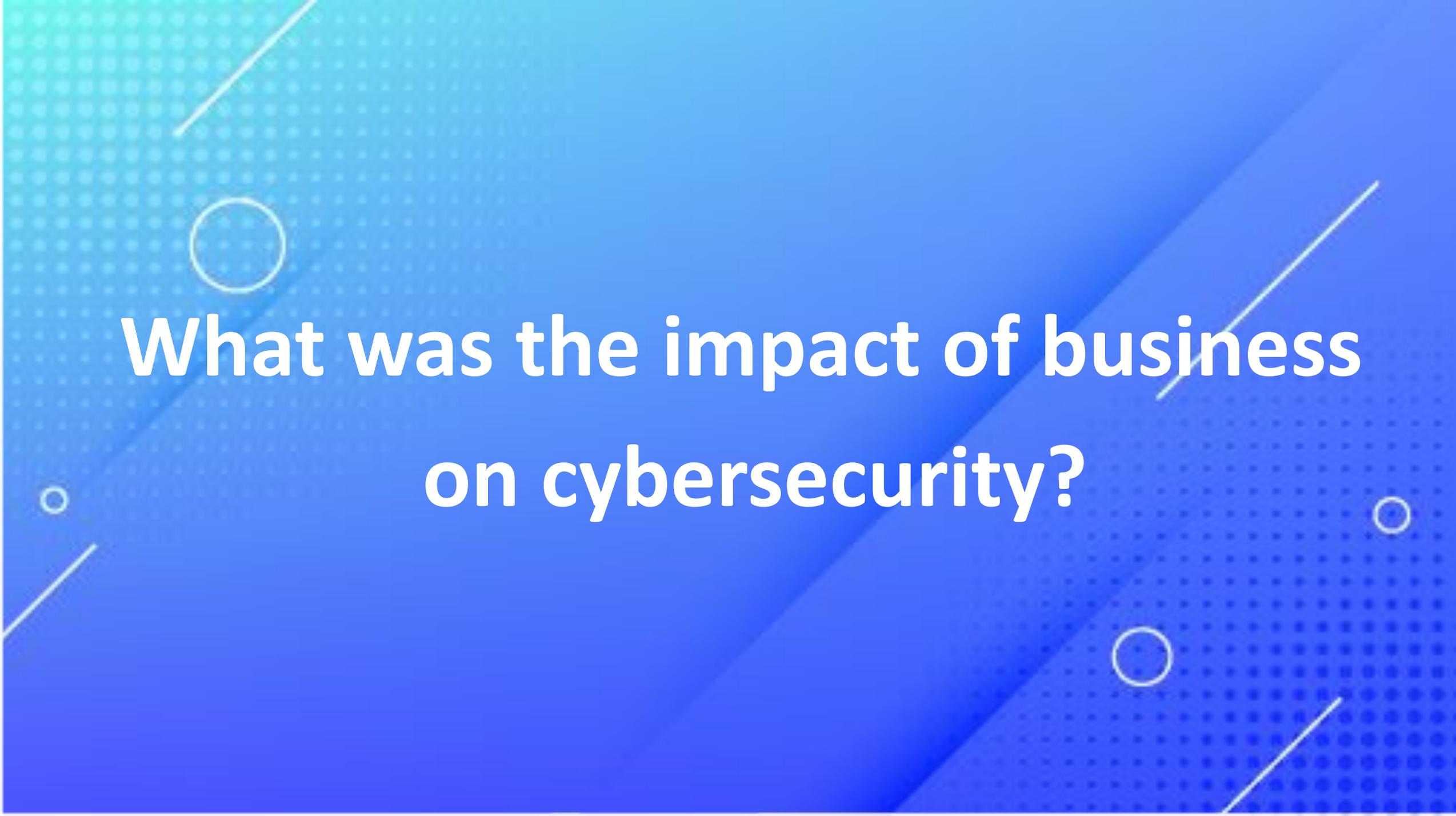
**What was the impact of early
hacks on cybersecurity?**



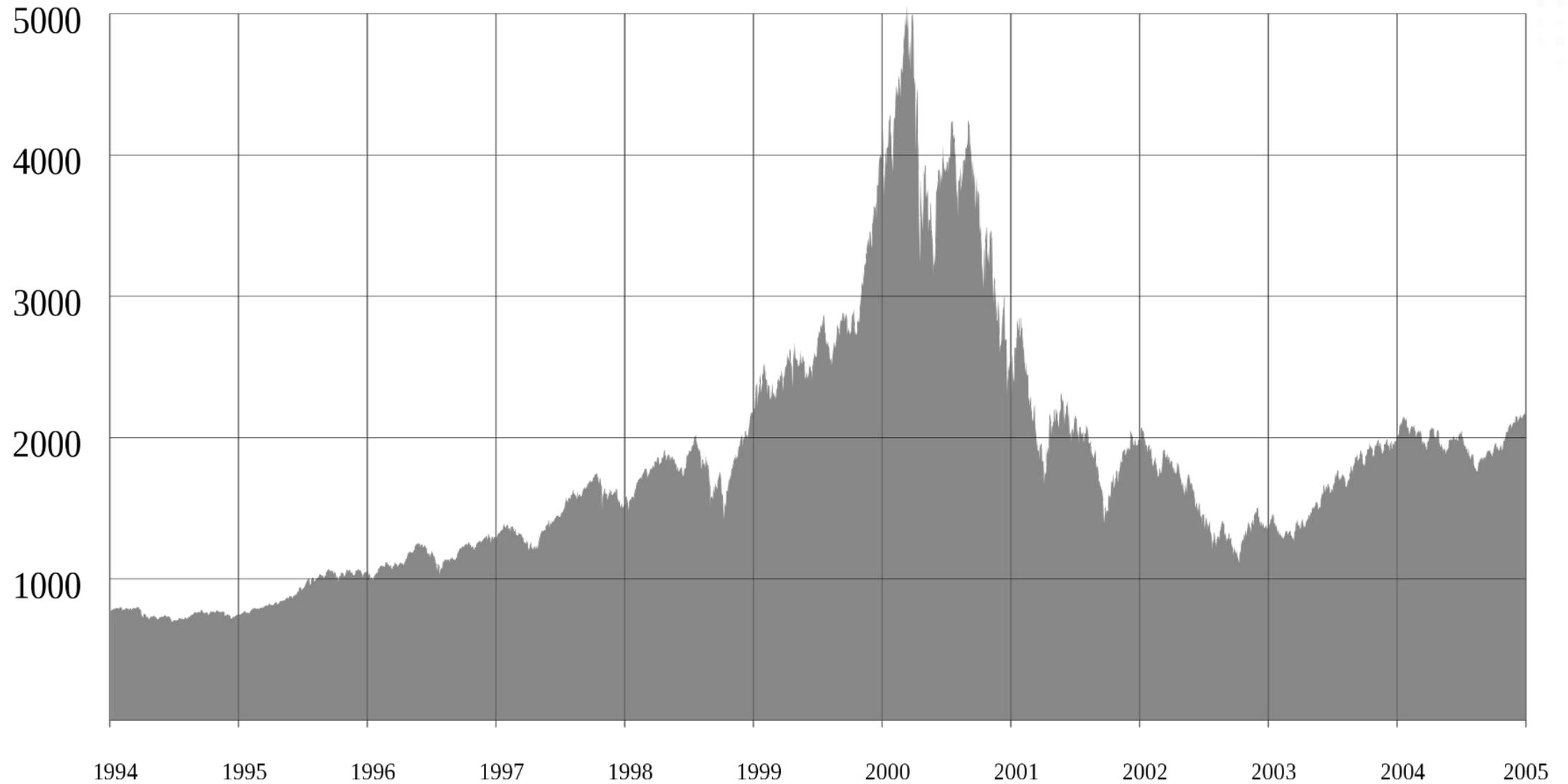




Microsoft Patch Tuesday

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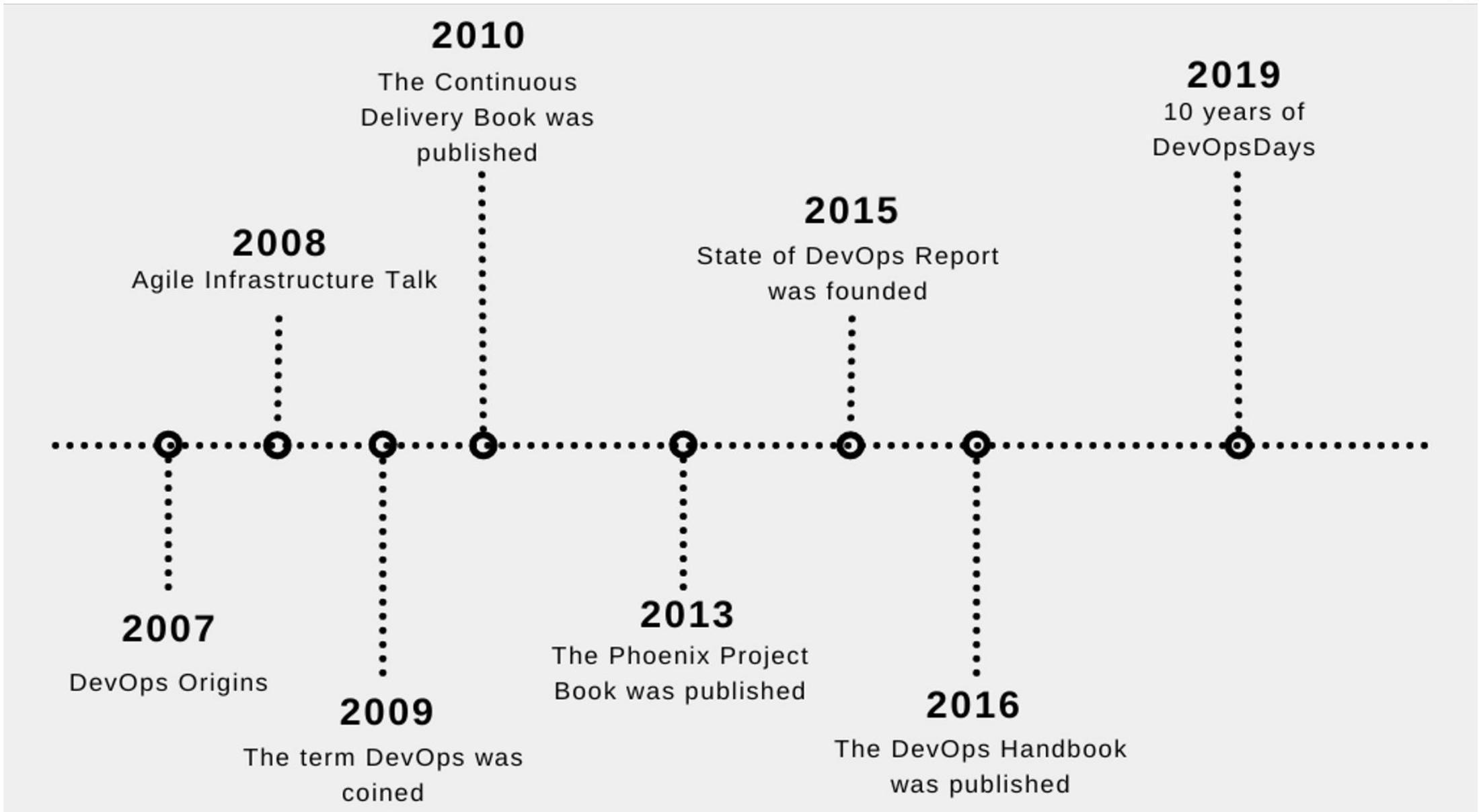
**What was the impact of business
on cybersecurity?**

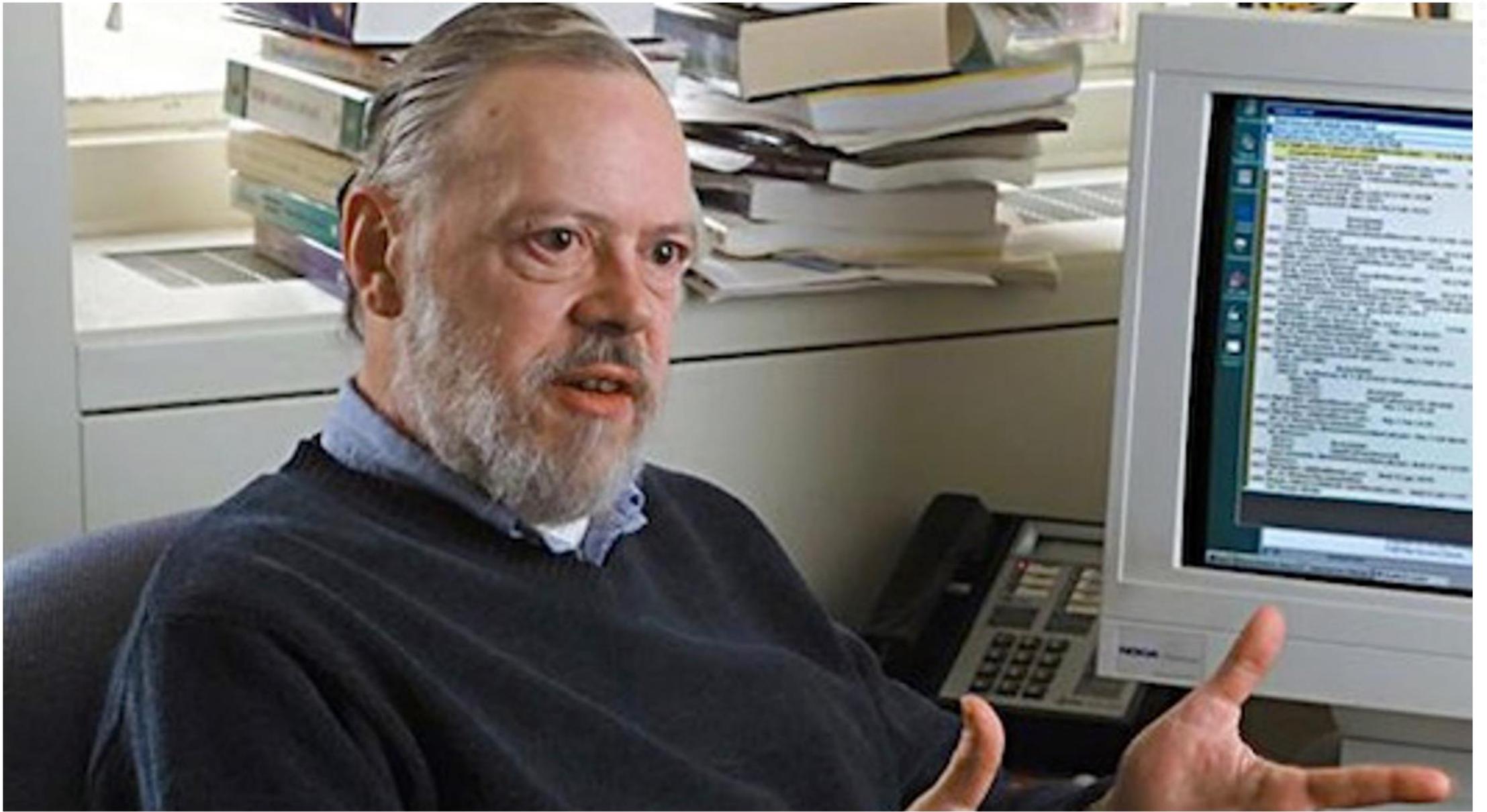




Ready, fire, aim. Do it! Make it happen! Action counts. No one ever sat their way to success.

— *Tom Peters* —







**What have been our strategy
choices for cybersecurity?**

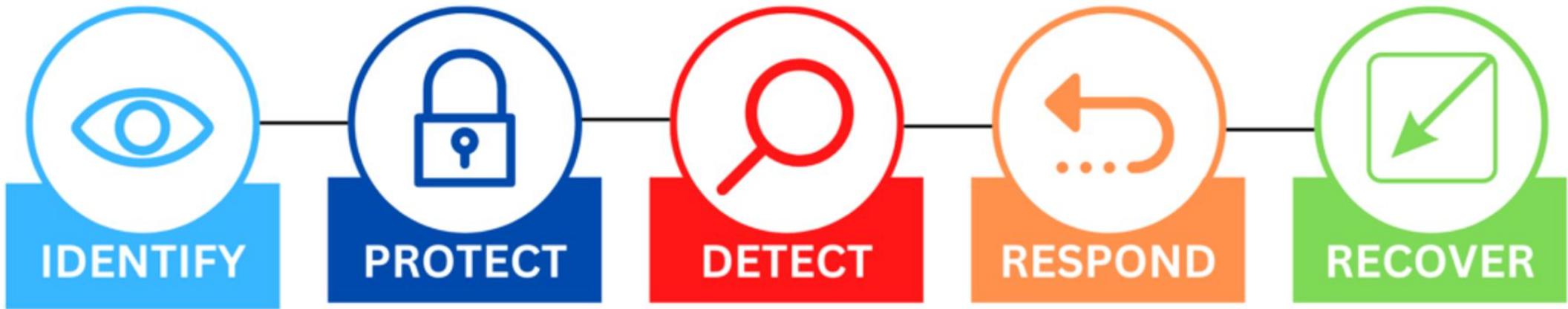
VENDOR EXPOSITION HALL 2022

Vendors who
SHIFT LEFT ←

Vendors who
SHIFT RIGHT →







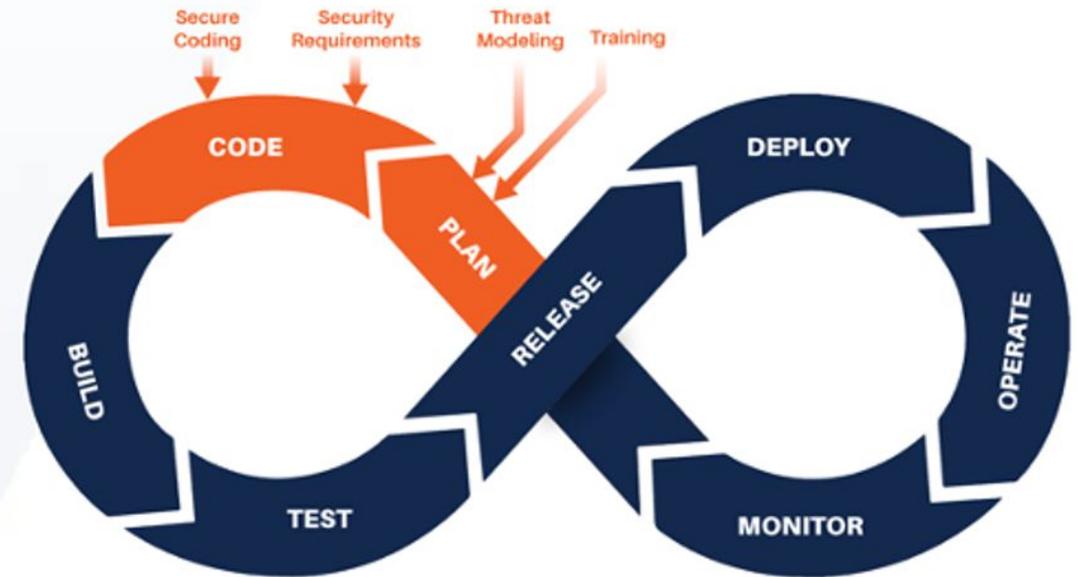


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