

THE FUTURE OF PROGRAMMING

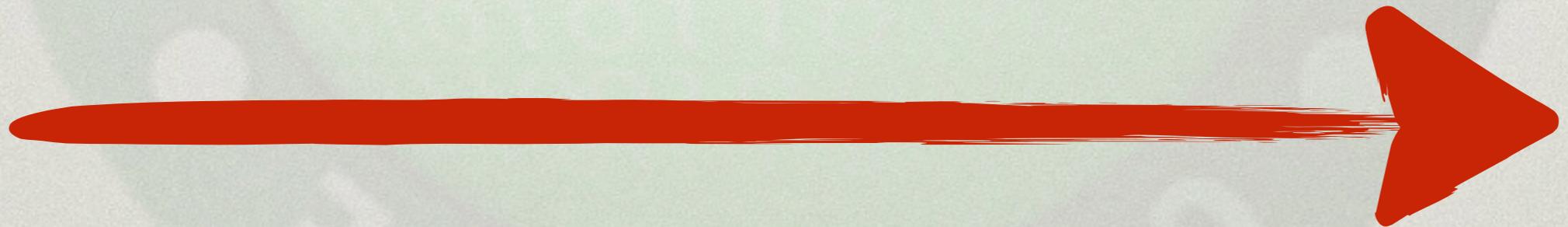


LOOKING BACK TO LOOK AHEAD

1940s



PROGRAMMING



20XX

1936

ON COMPUTABLE NUMBERS, WITH AN APPLICATION TO
THE ENTSCHIEDUNGSPROBLEM

By A. M. TURING.

[Received 28 May, 1936.—Read 12 November, 1936.]

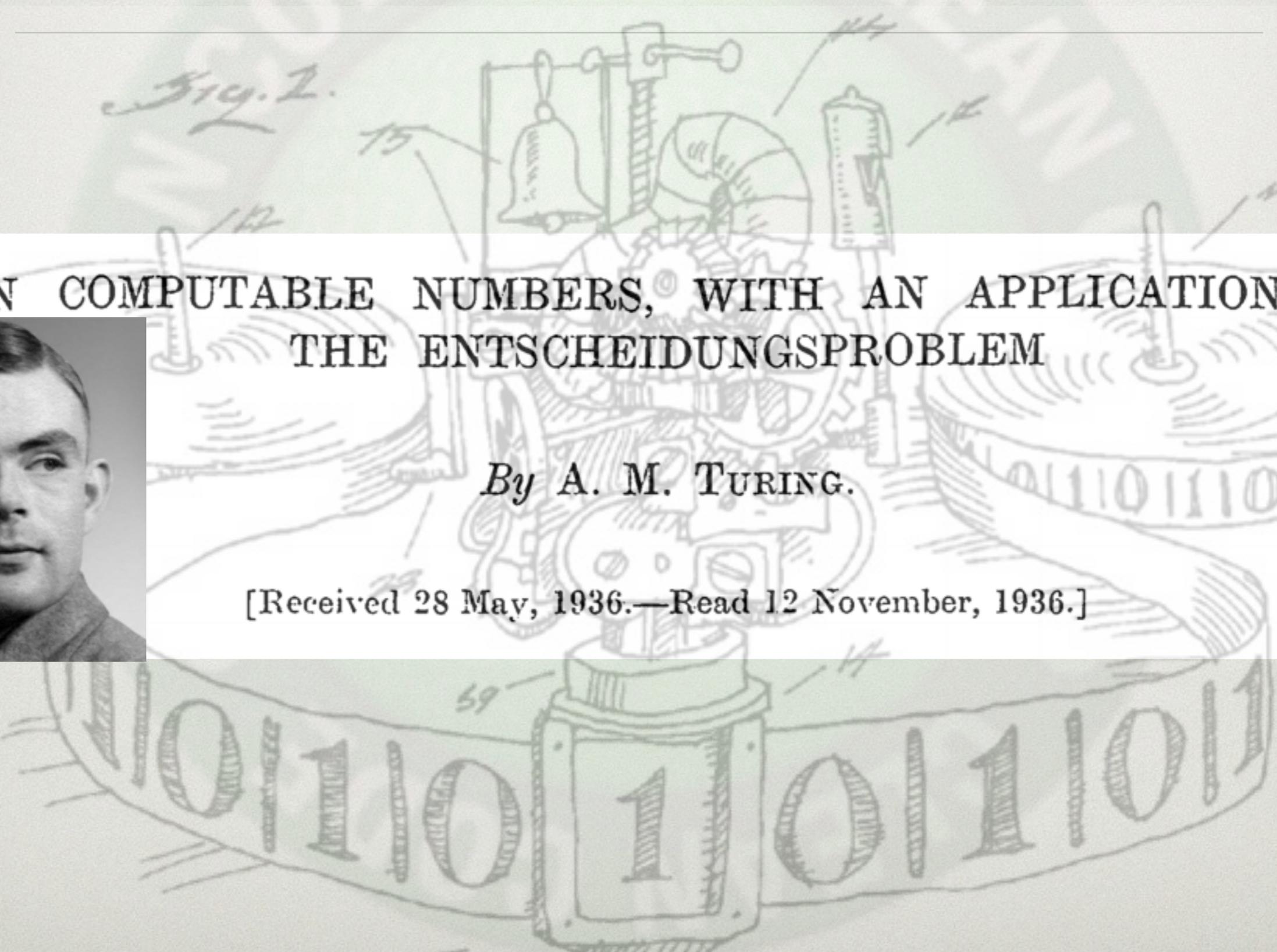


Fig. 2.

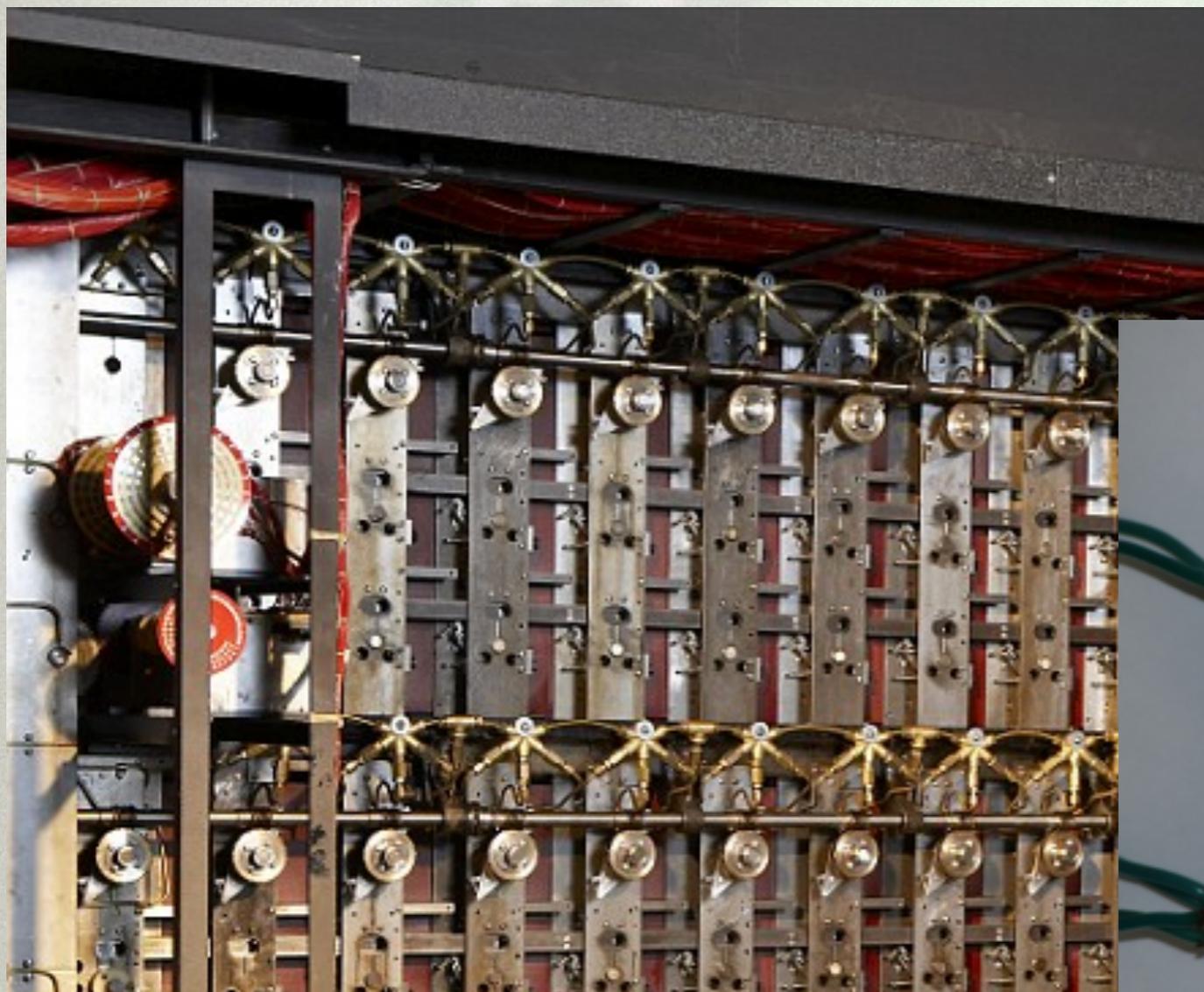
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12

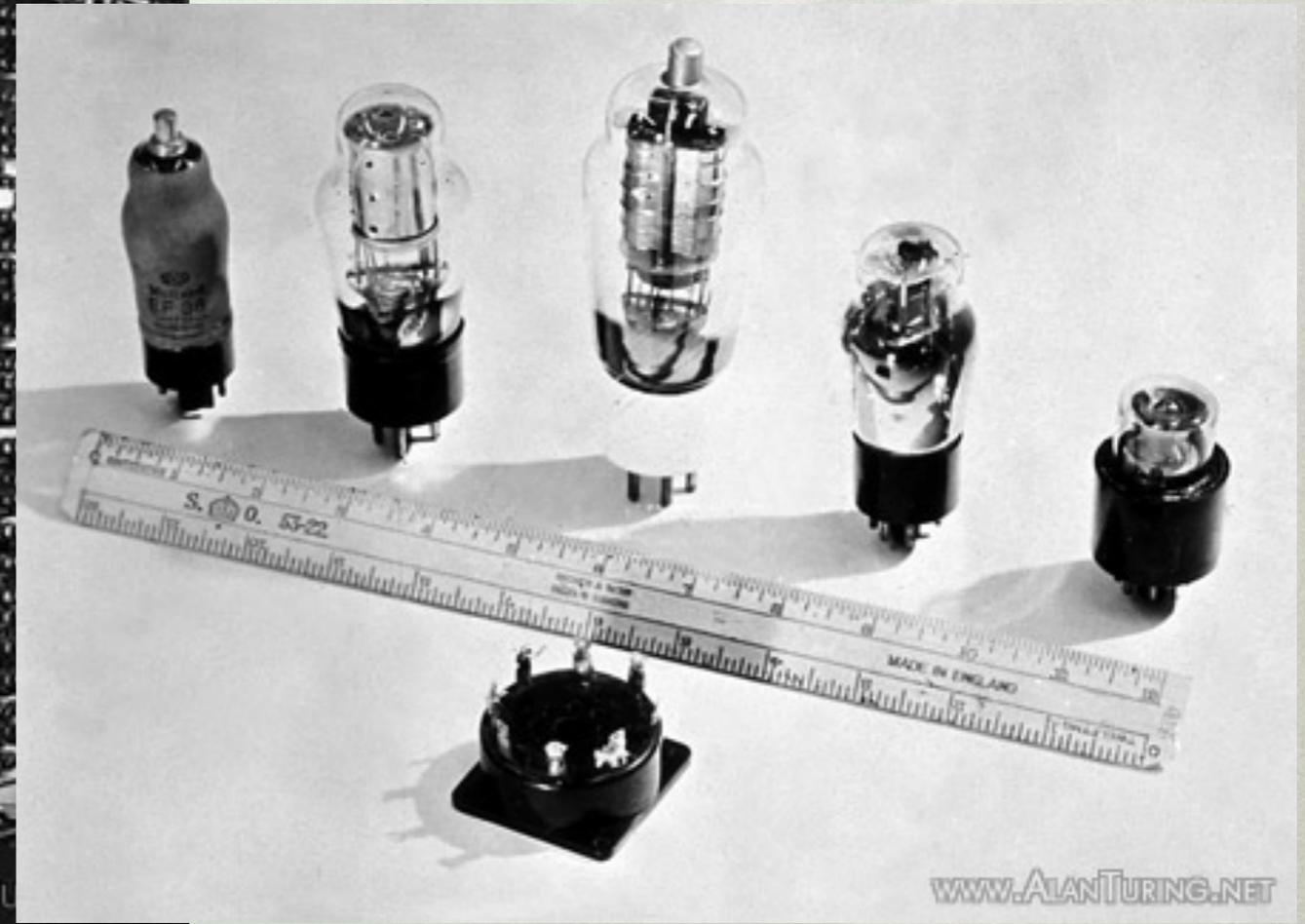
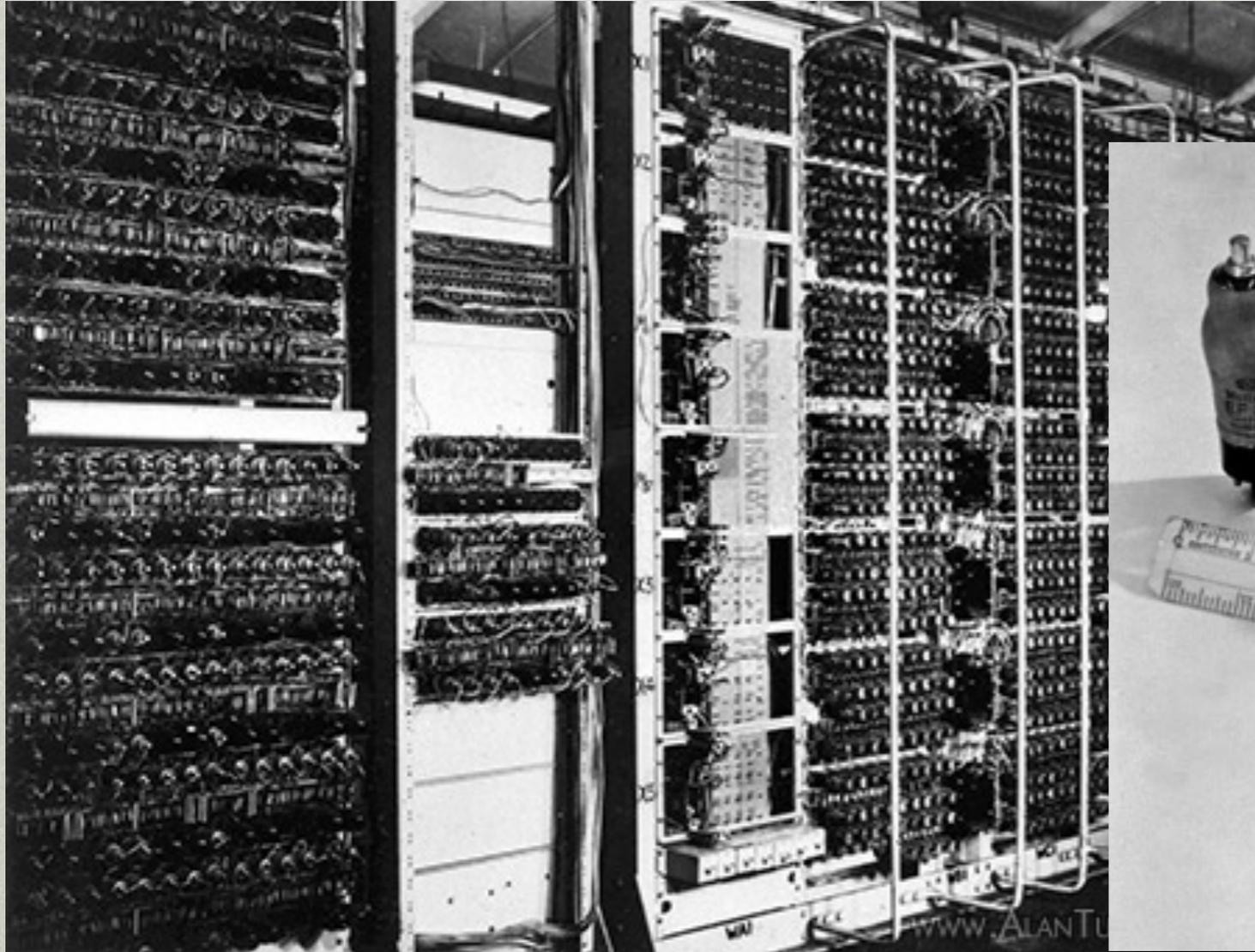
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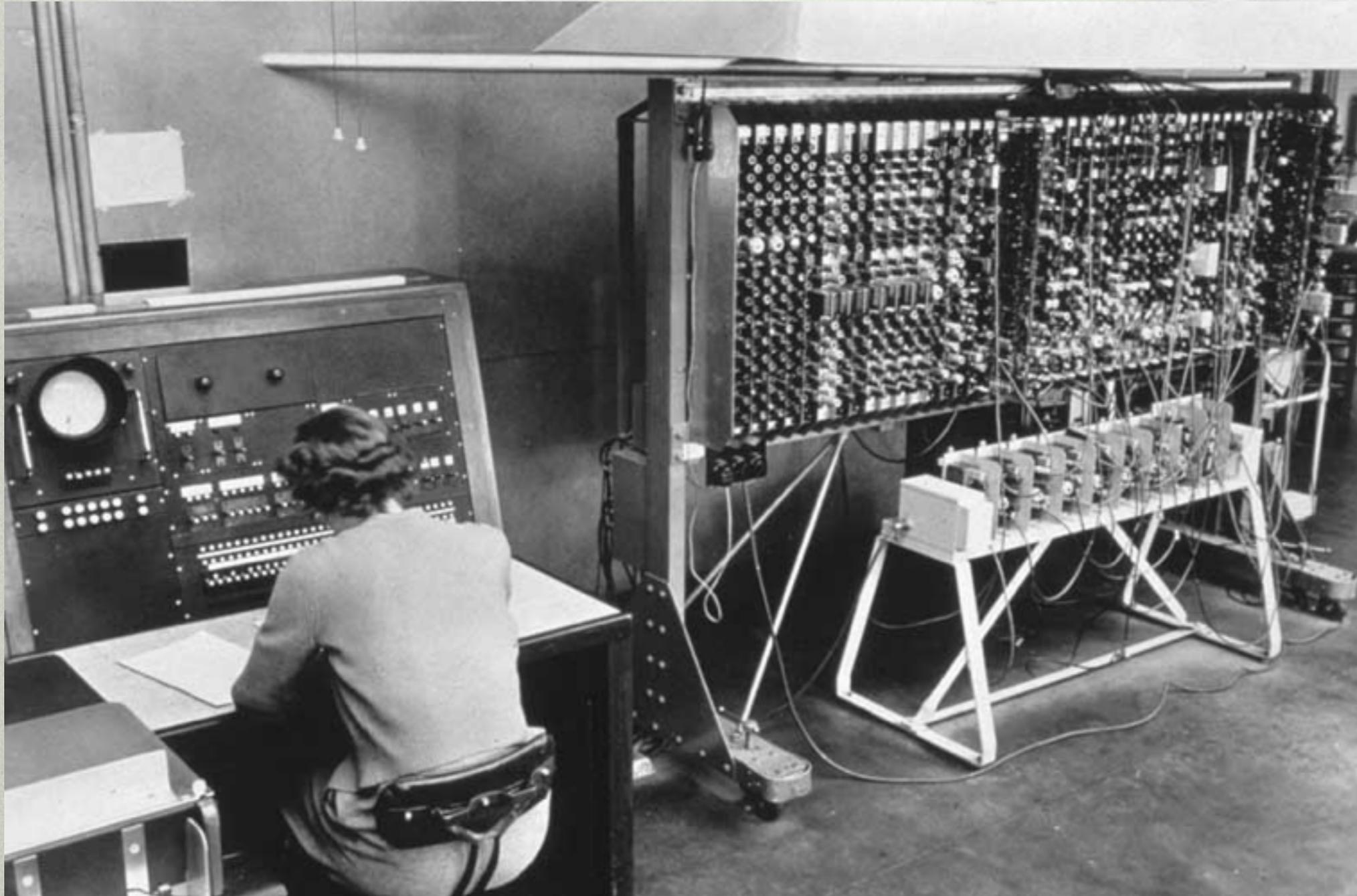
1939: THE BOMBE



1942 COLLOSUS



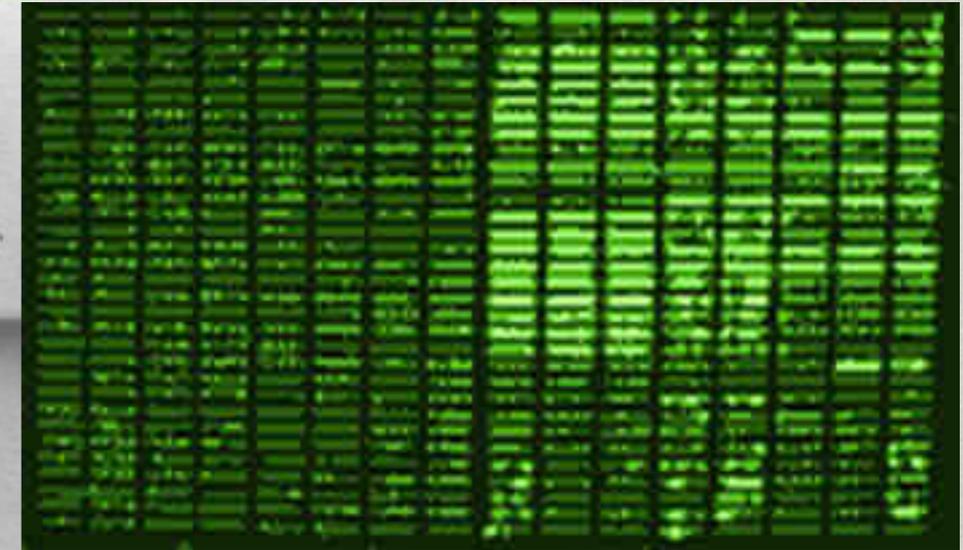
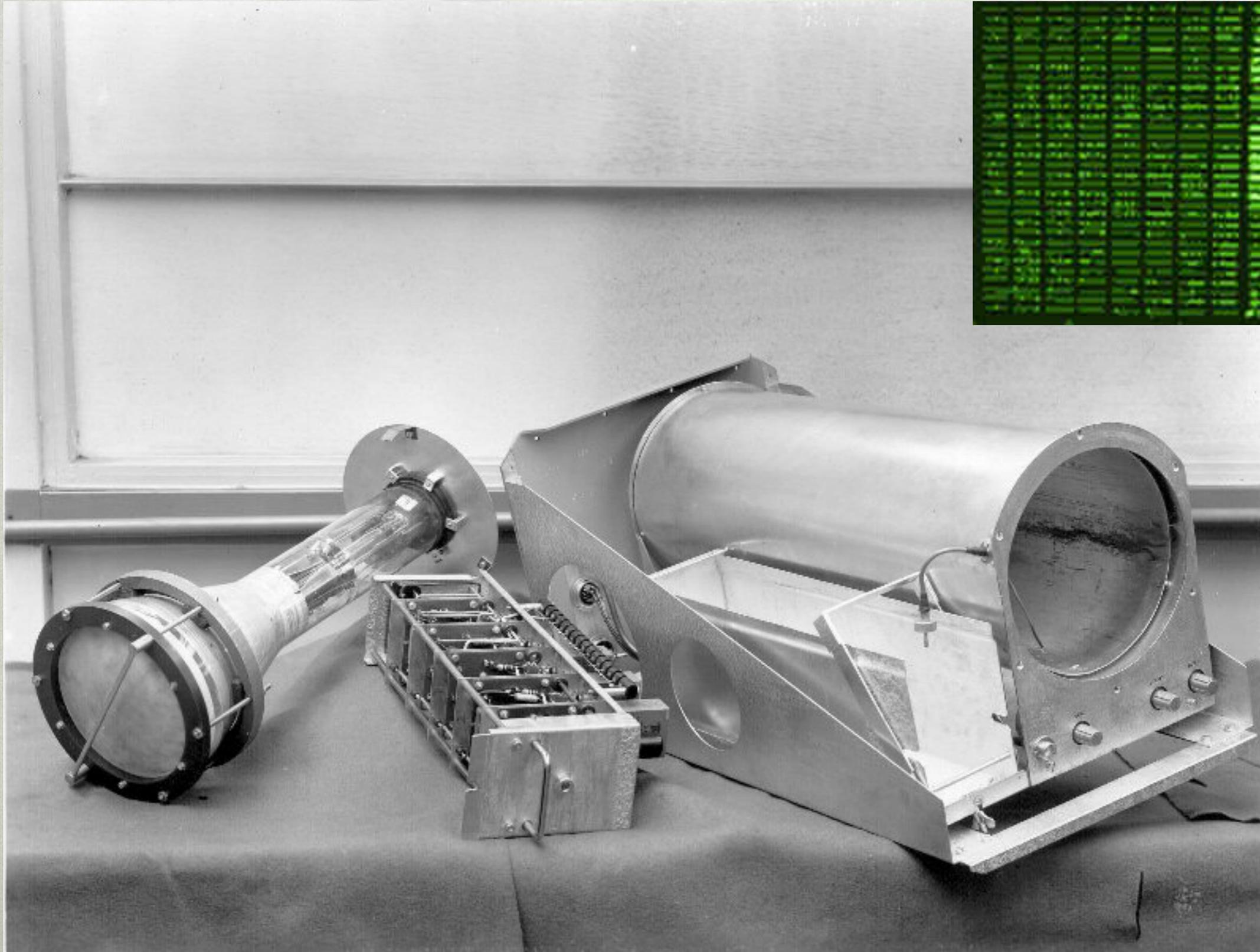
1945 ACE



1945: MERCURY DELAY LINES



1945: CRT MEMORY



1945

Turing writes **code**.

- * In binary. (base 32 reversed)
- * Uses integer 'add' and logical 'not'.
- * Invents subroutine
- * Invents and codes stack
- * Invents floating point
- * Etc.



1945

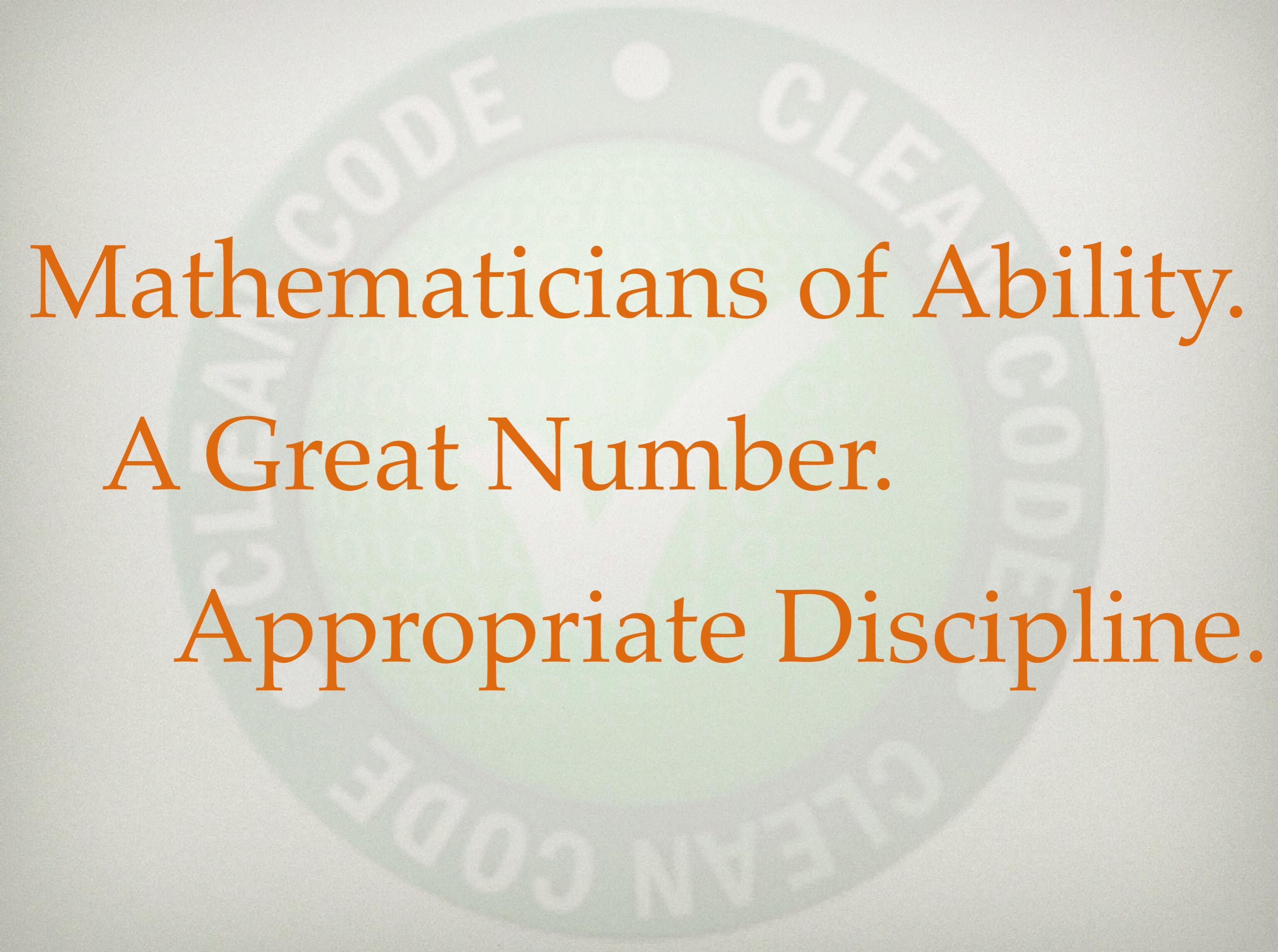


“We shall need a great number of mathematicians of ability” because “there will probably be a good deal of work of this kind to be done.”

1945



“One of our difficulties will be the maintenance of an appropriate discipline, so that we do not lose track of what we are doing.”



Mathematicians of Ability.

A Great Number.

Appropriate Discipline.

1945

**Number of computers
in the world:**

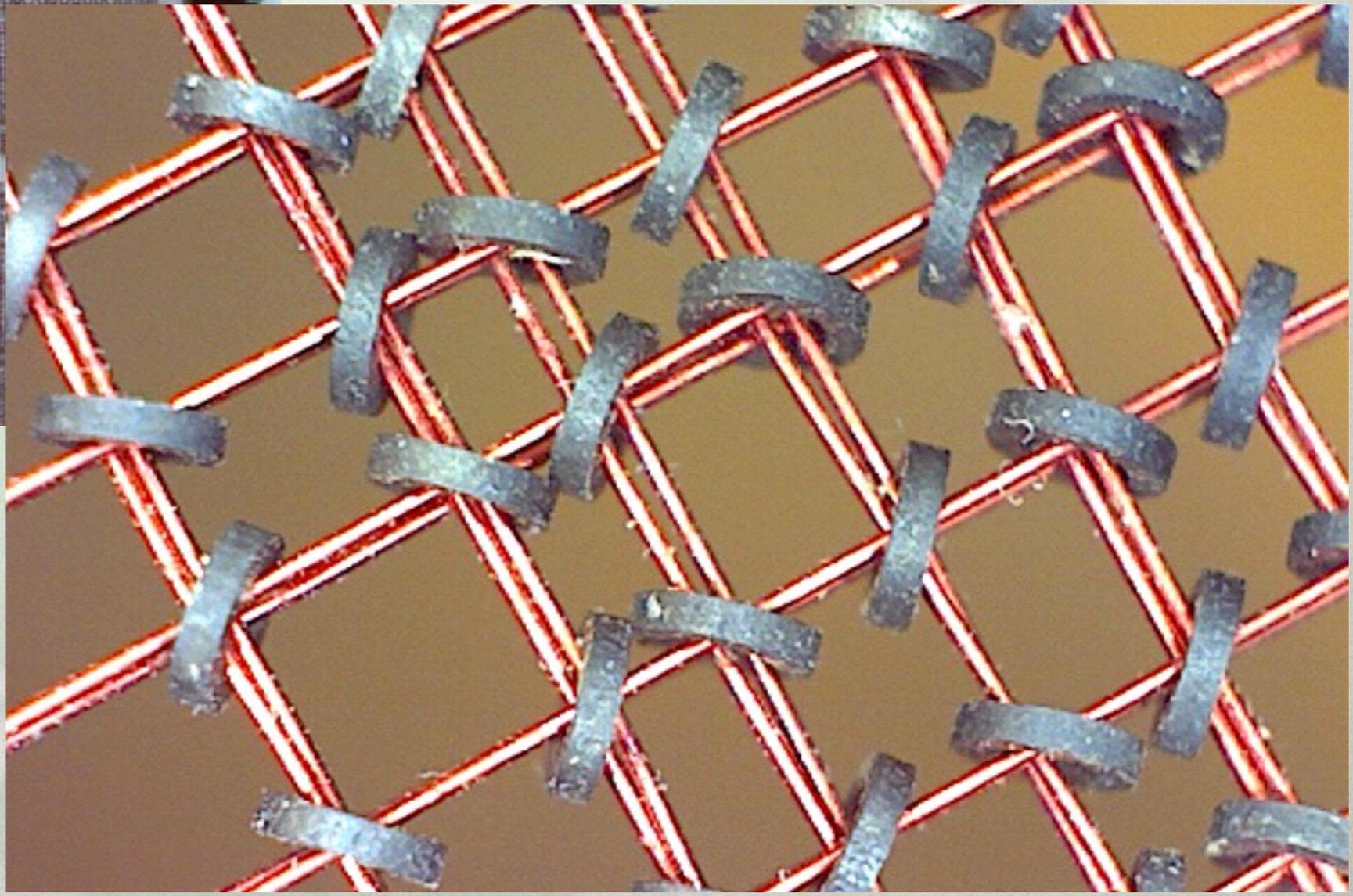
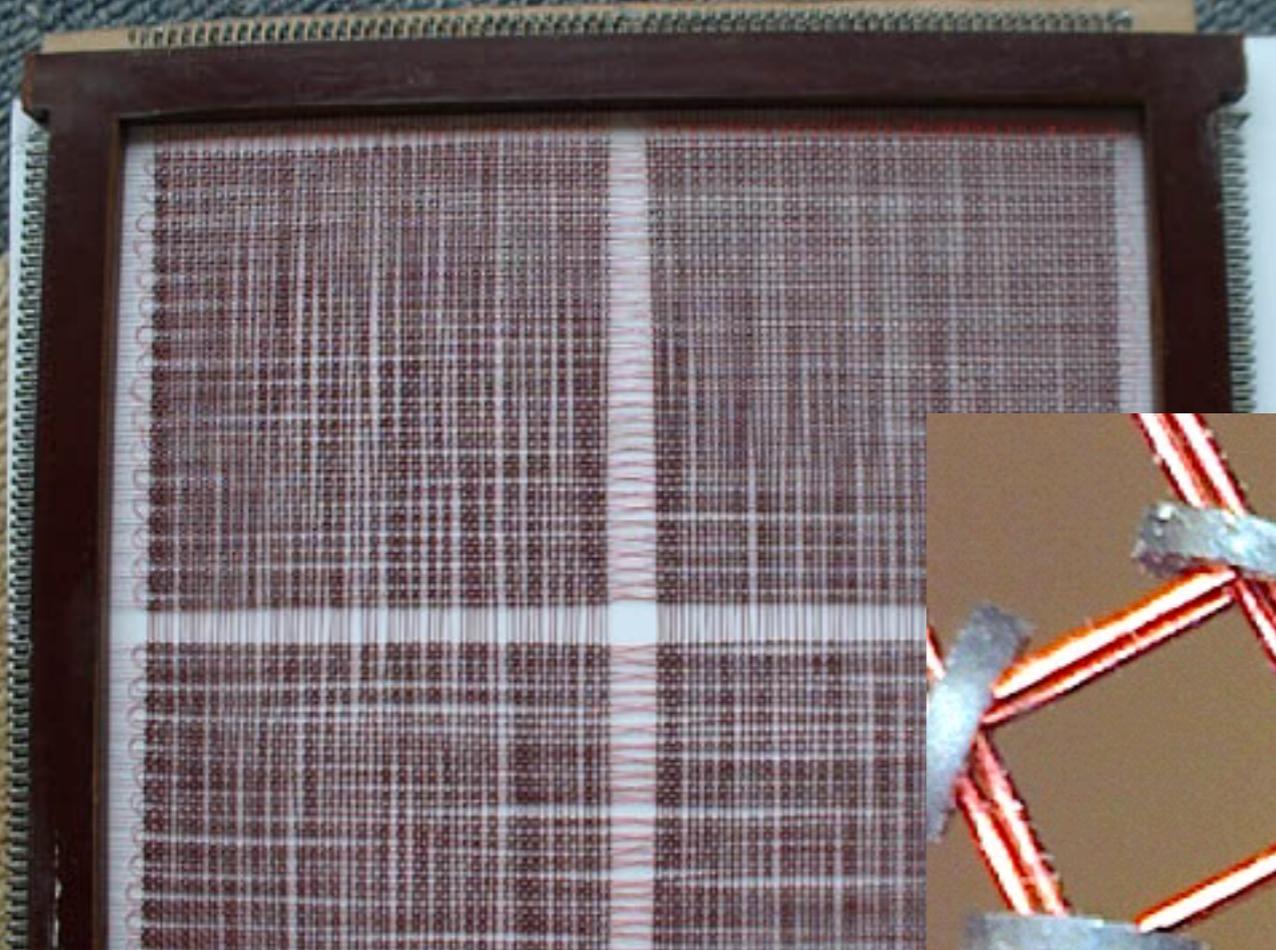
0 (1)

1945

**Number of programmers
in the world:**

0 (1)

1950s



1950s



1953 FORTRAN

C AREA OF A TRIANGLE WITH A STANDARD SQUARE ROOT FUNCTION

C INPUT - TAPE READER UNIT 5, INTEGER INPUT

C OUTPUT - LINE PRINTER UNIT 6, REAL OUTPUT

C INPUT ERROR DISPLAY ERROR OUTPUT CODE 1 IN JOB CONTROL LISTING

READ INPUT TAPE 5, 501, IA, IB, IC

501 FORMAT (3I5)

C IA, IB, AND IC MAY NOT BE NEGATIVE

C FURTHERMORE, THE SUM OF TWO SIDES OF A TRIANGLE

C IS GREATER THAN THE THIRD SIDE, SO WE CHECK FOR THAT, TOO

IF (IA) 777, 777, 701

701 IF (IB) 777, 777, 702

702 IF (IC) 777, 777, 703

703 IF (IA+IB-IC) 777,777,704

704 IF (IA+IC-IB) 777,777,705

705 IF (IB+IC-IA) 777,777,799

777 STOP 1

C USING HERON'S FORMULA WE CALCULATE THE

C AREA OF THE TRIANGLE

799 S = FLOATF (IA + IB + IC) / 2.0

AREA = SQRT(S * (S - FLOATF(IA)) * (S - FLOATF(IB)) *

+ (S - FLOATF(IC)))

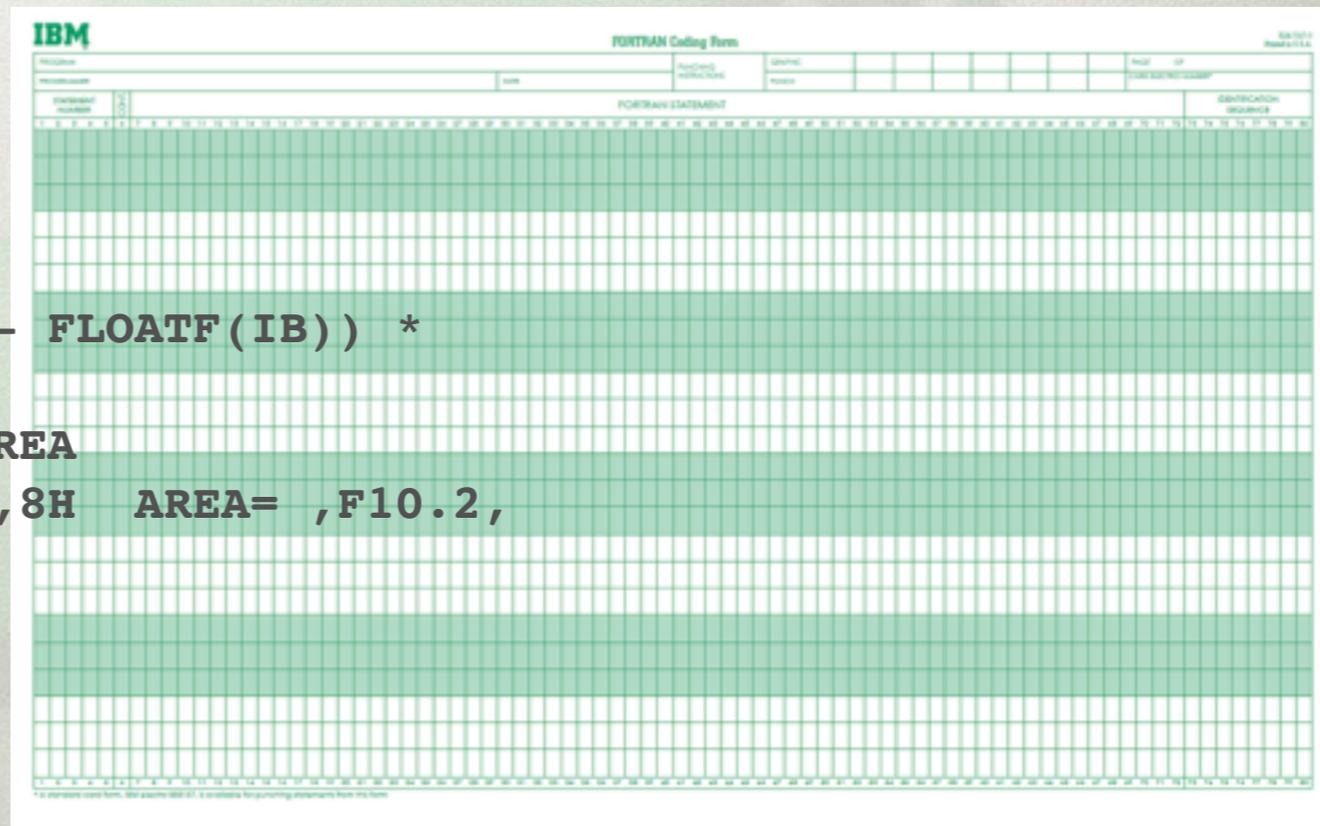
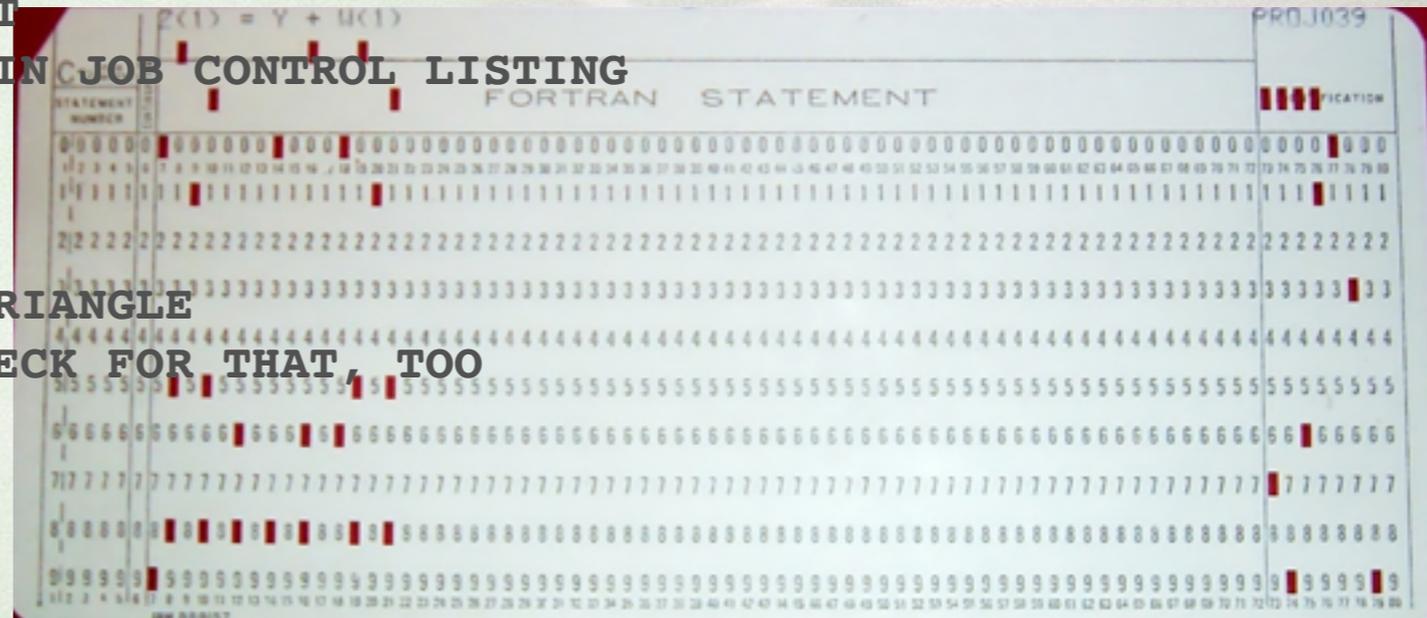
WRITE OUTPUT TAPE 6, 601, IA, IB, IC, AREA

601 FORMAT (4H A= ,I5,5H B= ,I5,5H C= ,I5,8H AREA= ,F10.2,

+ 13H SQUARE UNITS)

STOP

END



1958 - LISP

```
DEFINE
(( (RVRSE, (LAMBDA, (L), (COND, ((NULL, L), NIL),
    (T, (CONS, (RVRSE, (CDR, L)), (CONS, (CAR, L), NIL)))))),
(RVDE, (LAMBDA, (L), (REV, L, NIL))),
(REV, (LAMBDA, (J, K), (COND, ((NULL, J), K),
    (T, (REV, (CDR, J), (CONS, (CAR, J), K)))))))
()
RVRSE ((A,B,C,D,E)) ()
RVDE ((A,B,C,D,E)) ()
```

FUNCTIONAL PROGRAMMING

1954-1960

IBM sold 140 model
70x computers.

Fortran
Lisp.



1960

**Number of computers
in the world:**

0 (1E2)

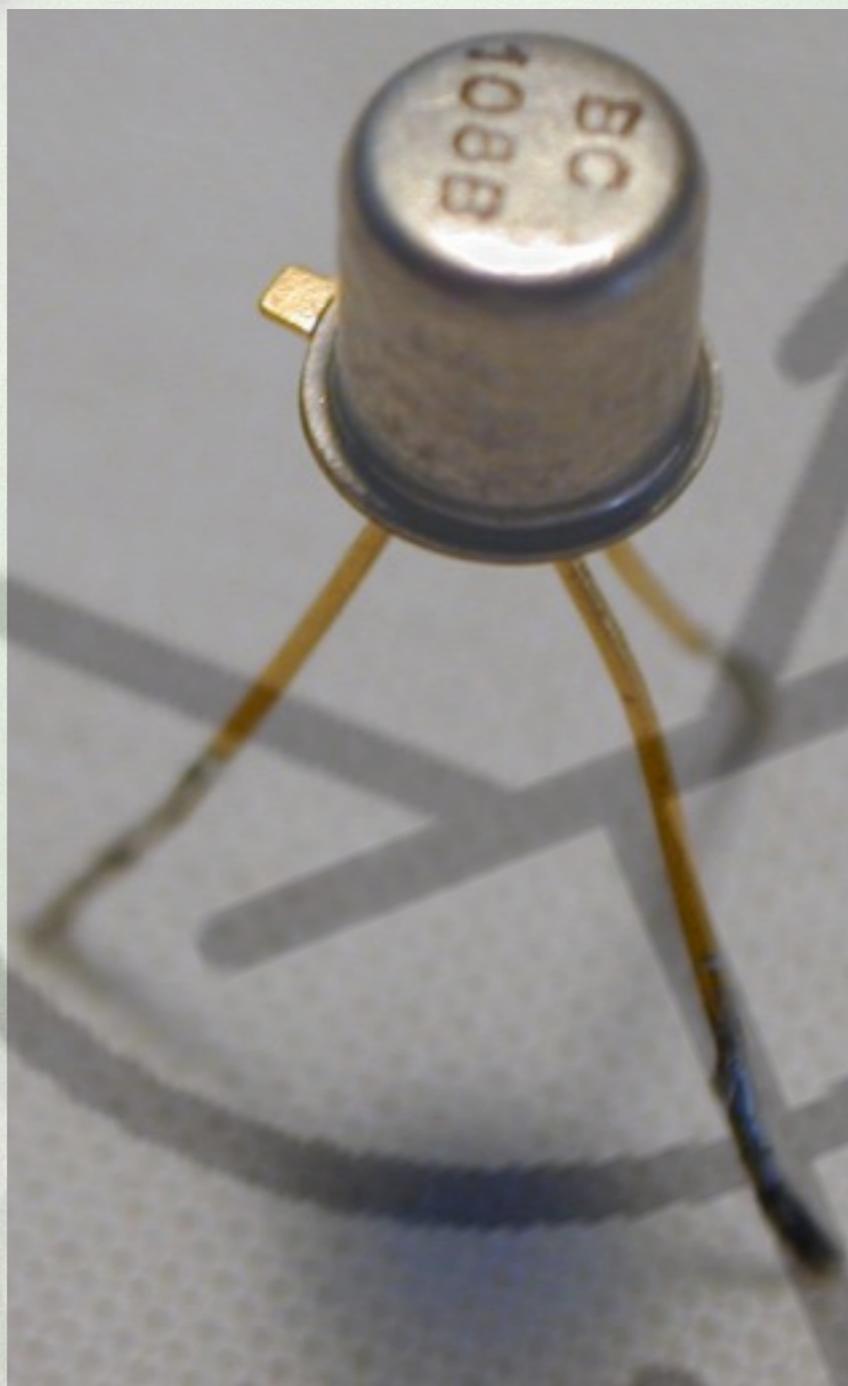
1960

**Number of programmers
in the world:**

0 (1E3)

1950s

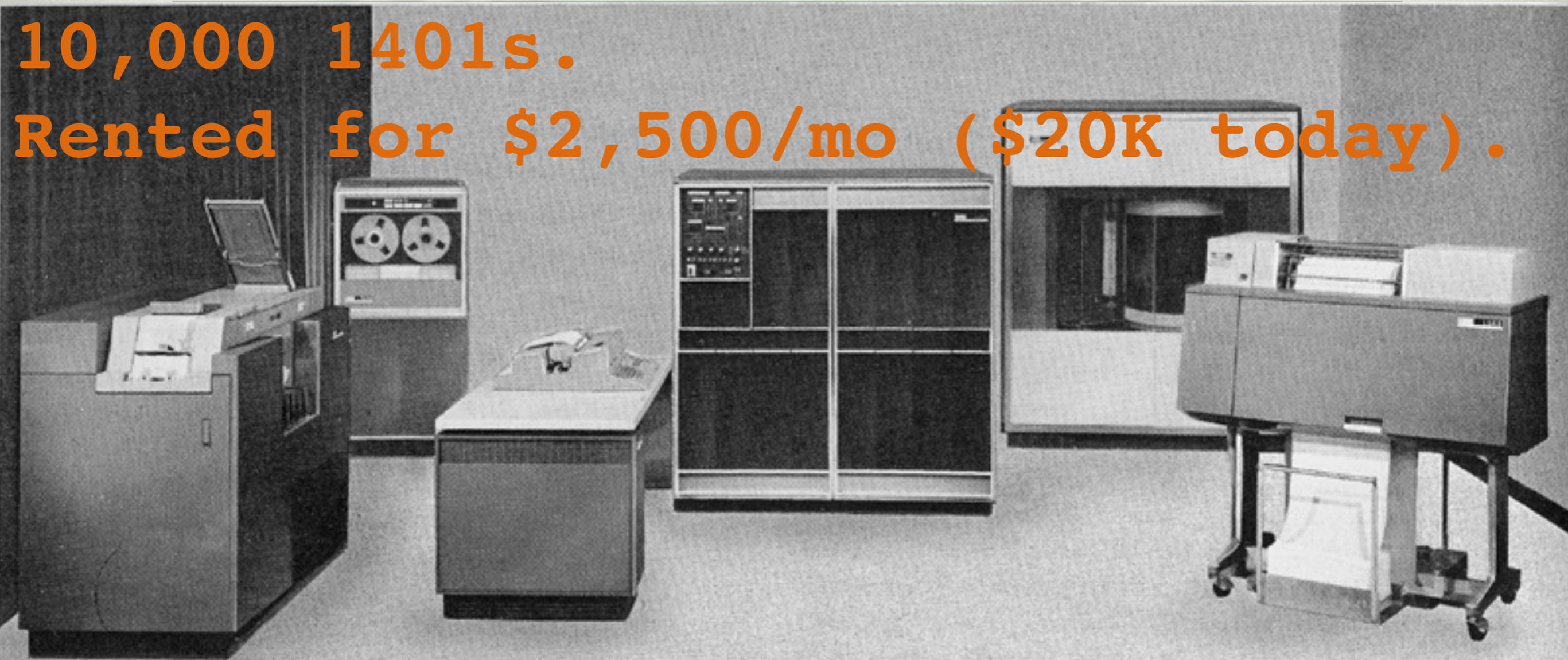
- Programmers were drawn from:
 - Engineers
 - Scientists
 - Mathematicians



1965

10,000 1401s.

Rented for \$2,500/mo (\$20K today).



This put the 1401 in reach of many businesses who eagerly bought them.

1965

**Number of computers
in the world:**

0 (1E4)

1965

**Number of programmers
in the world:**

0 (1E5)

LOOKING BACK TO LOOK AHEAD

1945:

1

I am 13



Programmers

I am 13



1965:

100,000

1965

- Not Enough:
 - Engineers, Scientists, Mathematicians
- No CS Grads.
- Programmers drawn from:
 - Best and brightest
 - Accountants, Planners, etc.

1965

Though not mathematicians, they were:

Experienced, Disciplined, Professionals.

Turing would likely have approved.

1966

1,000 360s
every month.



1966 - SIMULA-67

OLE-JOHAN
DAHL

KRISTEN
NYGARD

OBJECT ORIENTATION



1968 - GOTO



EDSGER DIJKSTRA

Go To Statement Considered Harmful

Key Words and Phrases: go to statement, jump instruction, branch instruction, conditional clause, alternative clause, repetitive clause, program intelligibility, program sequencing

CR Categories: 4.22, 5.23, 5.24

EDITOR:

For a number of years I have been familiar with the observation that the quality of programmers is a decreasing function of the density of **go to** statements in the programs they produce. More recently I discovered why the use of the **go to** statement has such disastrous effects, and I became convinced that the **go to** statement should be abolished from all “higher level” programming languages (i.e. everything except, perhaps, plain machine code). At that time I did not attach too much importance to this discovery; I now submit my considerations for publication because

STRUCTURED PROGRAMMING

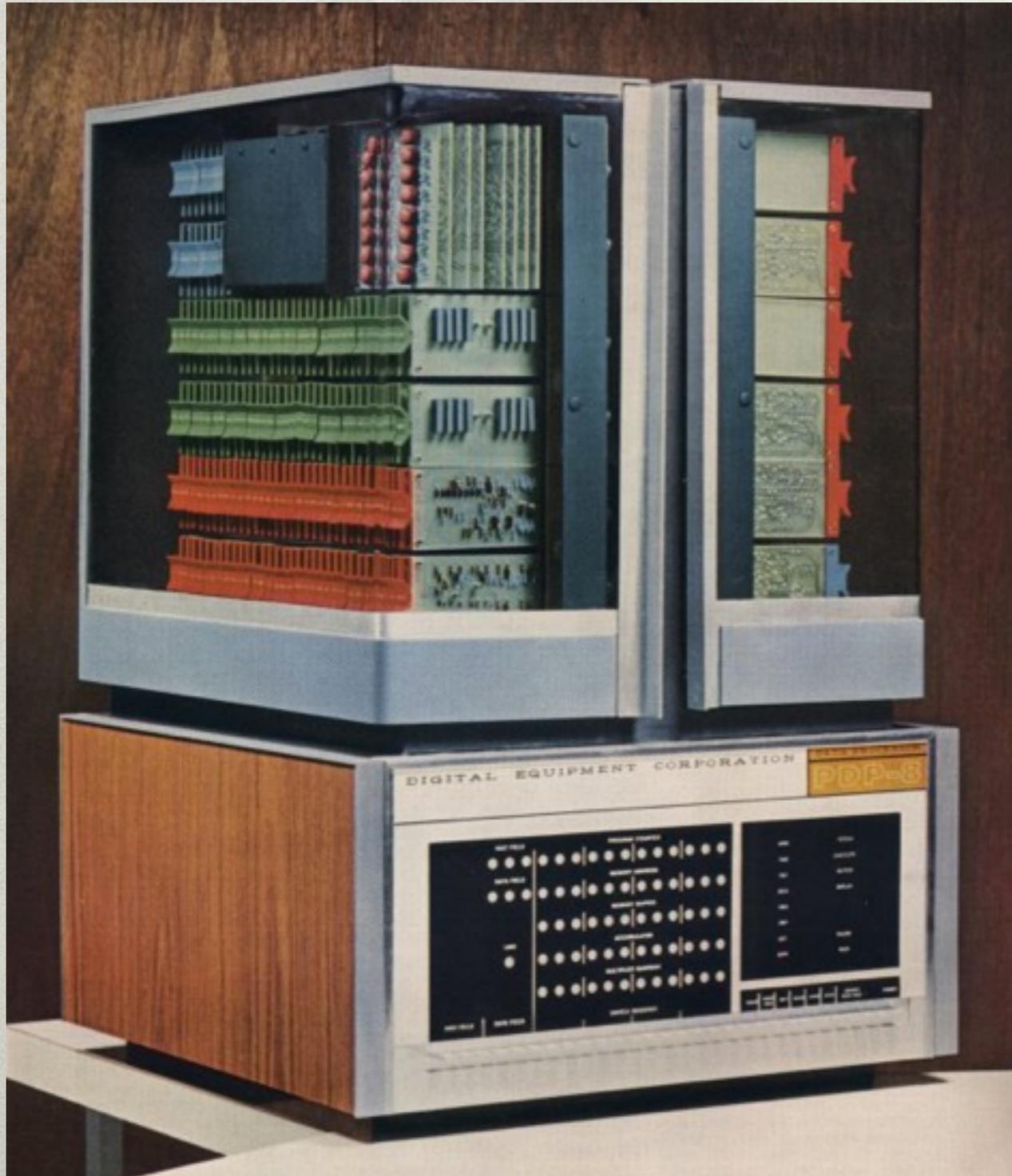
1968 - C



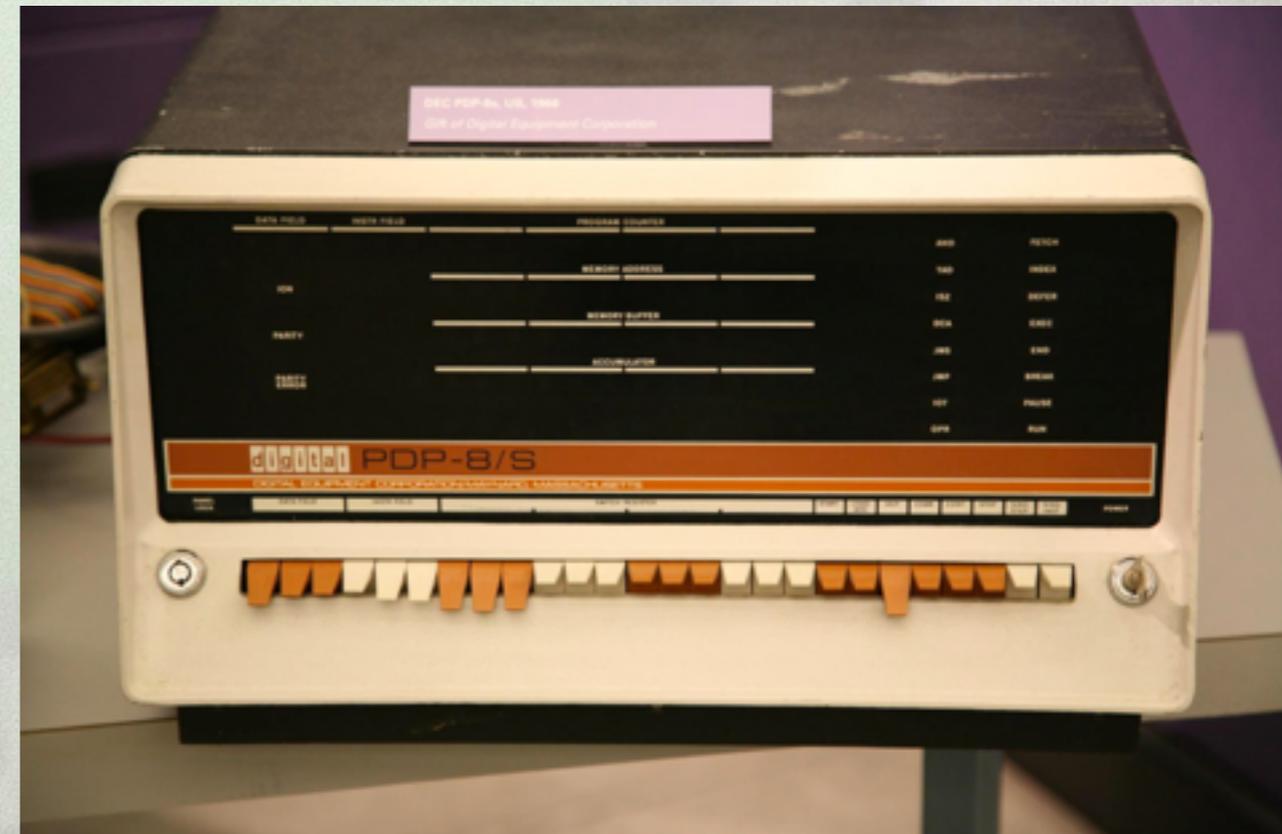
**KEN
THOMPSON**

**DENNIS
RITCHIE**

1970



50,000
PDP8s



1970

**Number of computers
in the world:**

0 (1E5)

1970

**Number of programmers
in the world:**

0 (1E6)

LOOKING BACK TO LOOK AHEAD

1945:

1

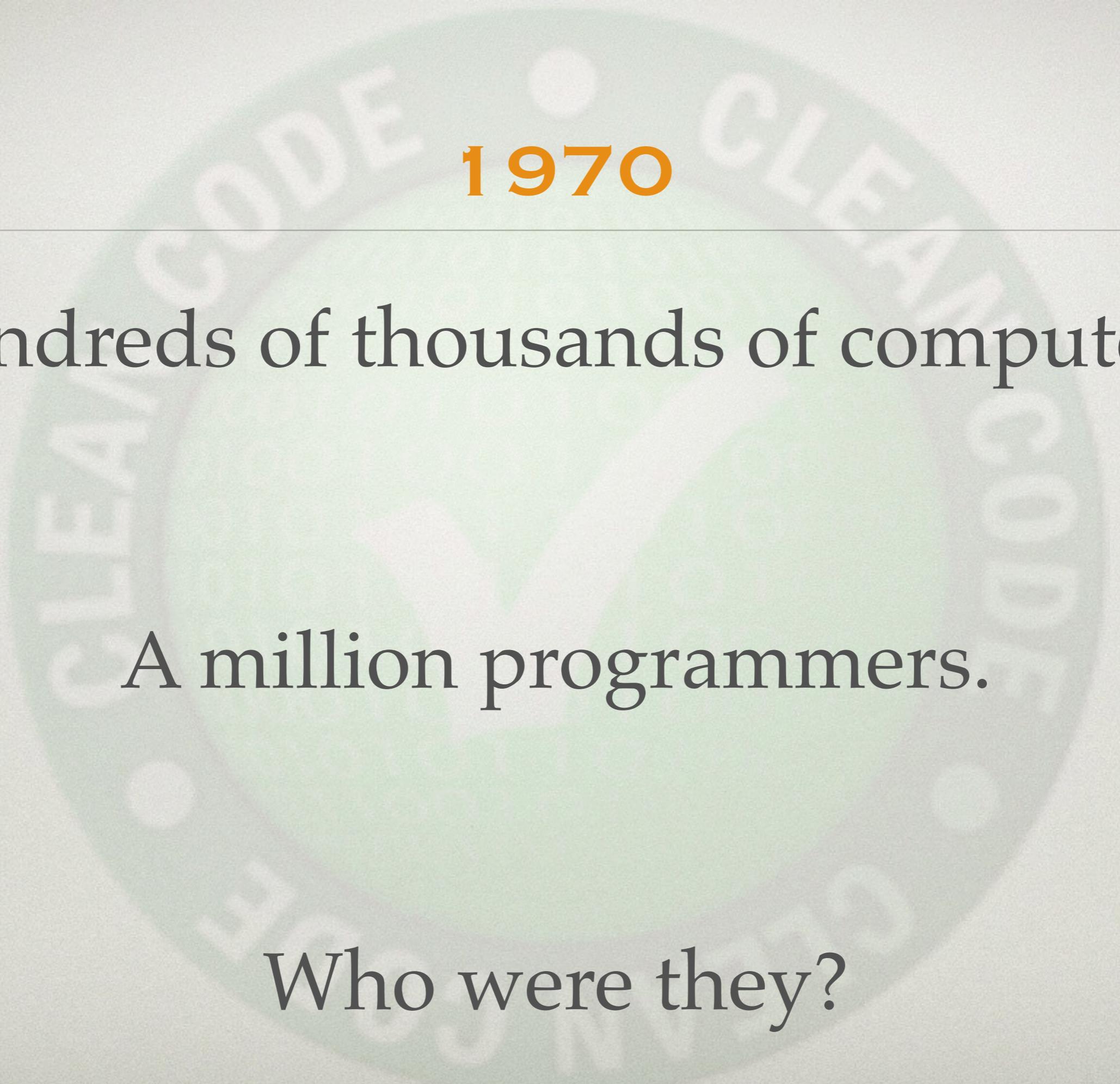


Programmers



1970:

1,000,000



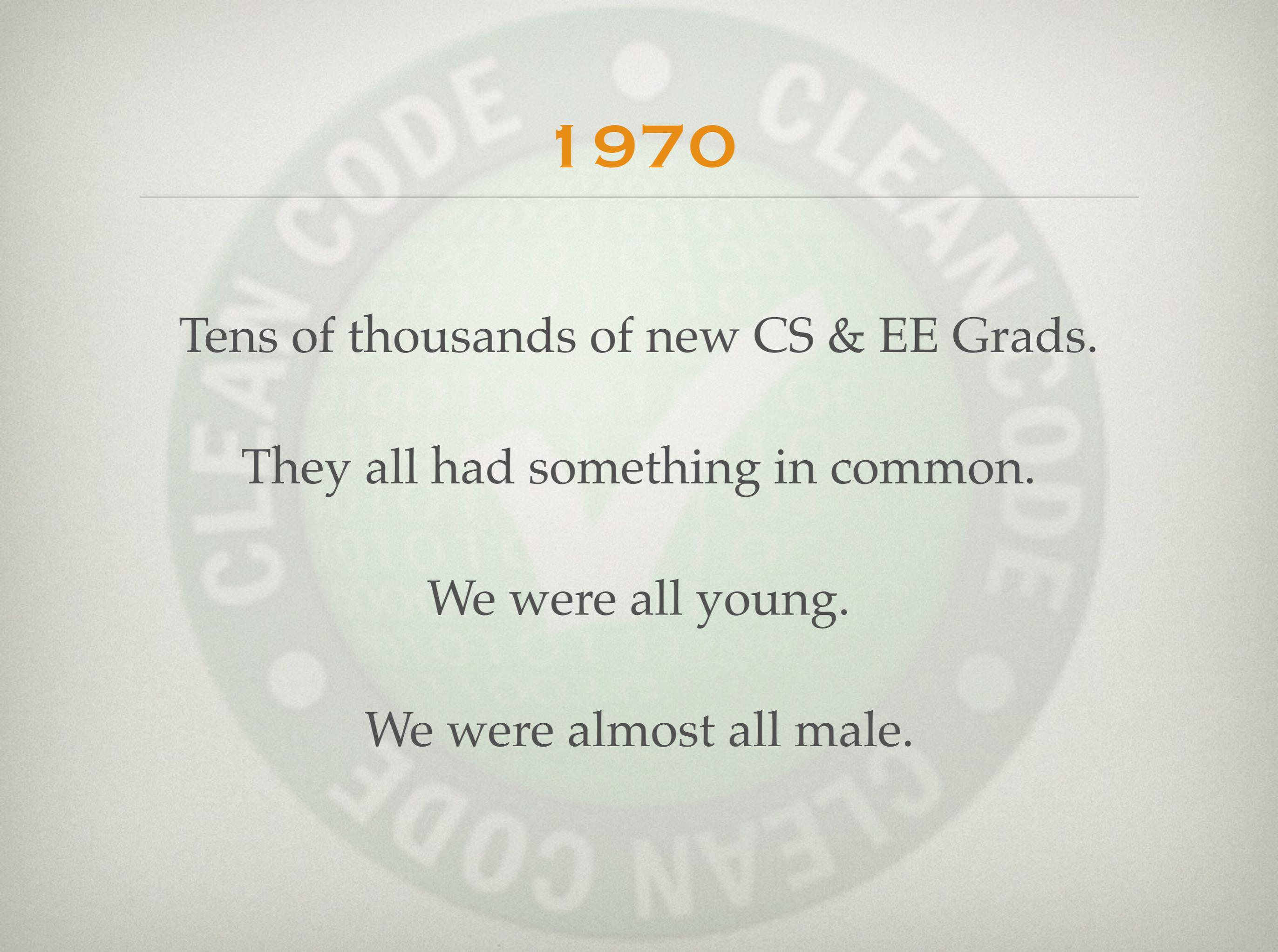
1970

Hundreds of thousands of computers.

A million programmers.

Who were they?





1970

Tens of thousands of new CS & EE Grads.

They all had something in common.

We were all young.

We were almost all male.

1970

At my first job there were ~24 programmers.

Most were in their thirties or forties;

and half were women.

1980

My employer had ~50 programmers.

All in their twenties or early thirties.

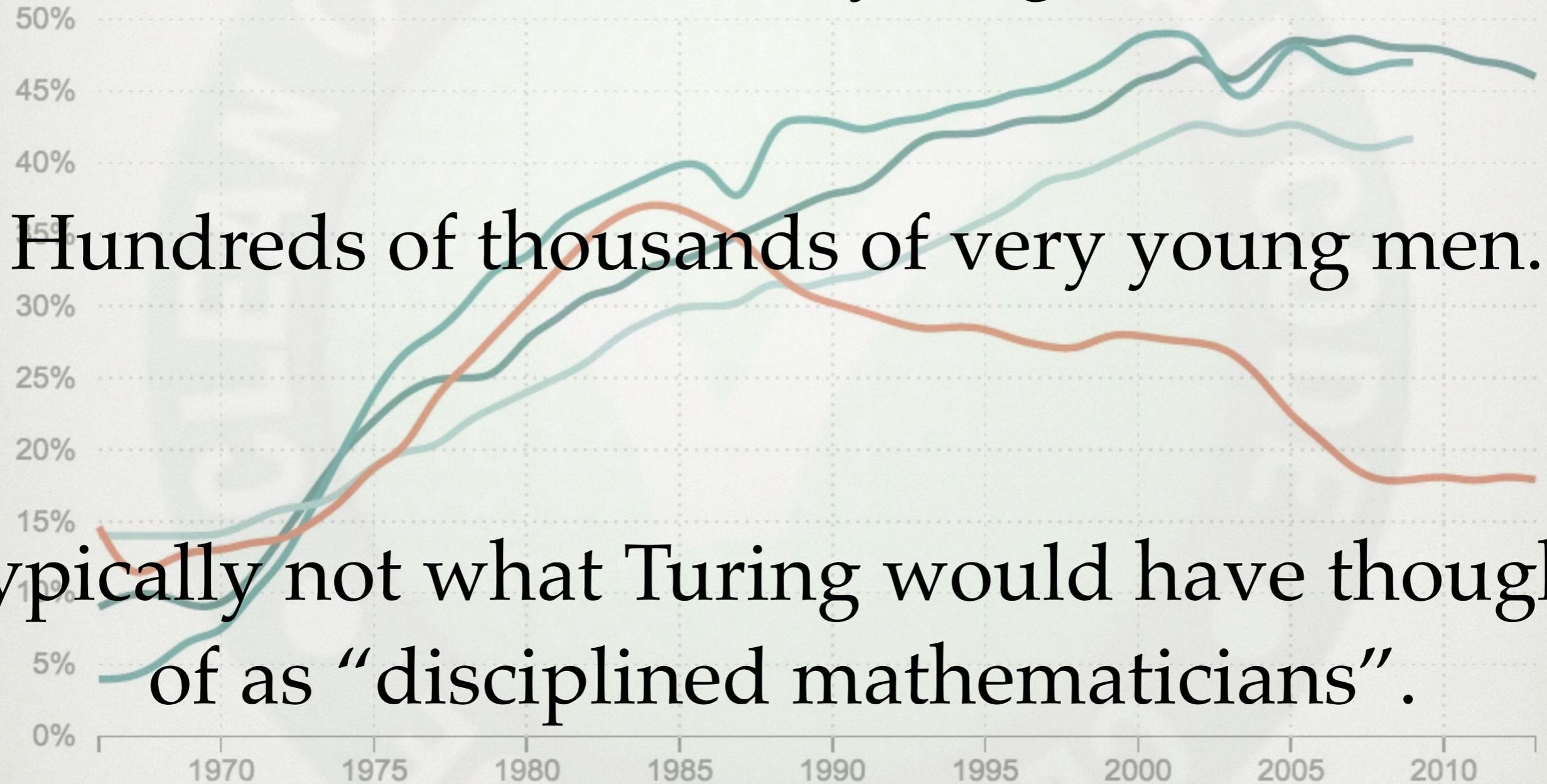
Two were women.

What Happened To Women In Computer Science?

% Of Women Majors, By Field

Medical School Law School Physical Sciences Computer science

The demographics of programming had decisively shifted towards young men.

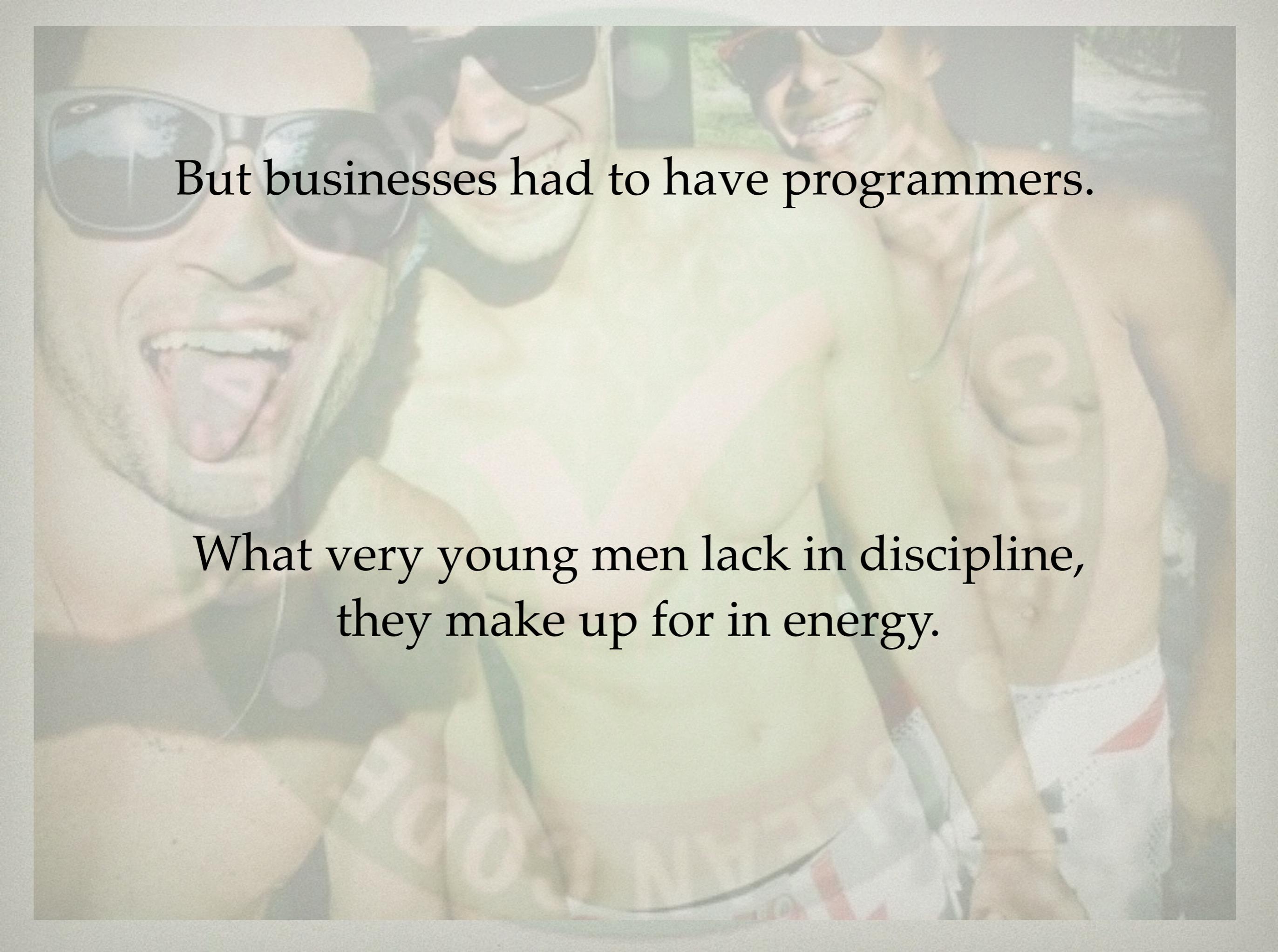


Hundreds of thousands of very young men.

typically not what Turing would have thought of as “disciplined mathematicians”.

Source: National Science Foundation, American Bar Association, American Association of Medical Colleges

Credit: Quoctrung Bui/NPR

A group of young men in swimwear and sunglasses, smiling and posing for a photo. The image is overlaid with text.

But businesses had to have programmers.

What very young men lack in discipline,
they make up for in energy.

And they're cheap.

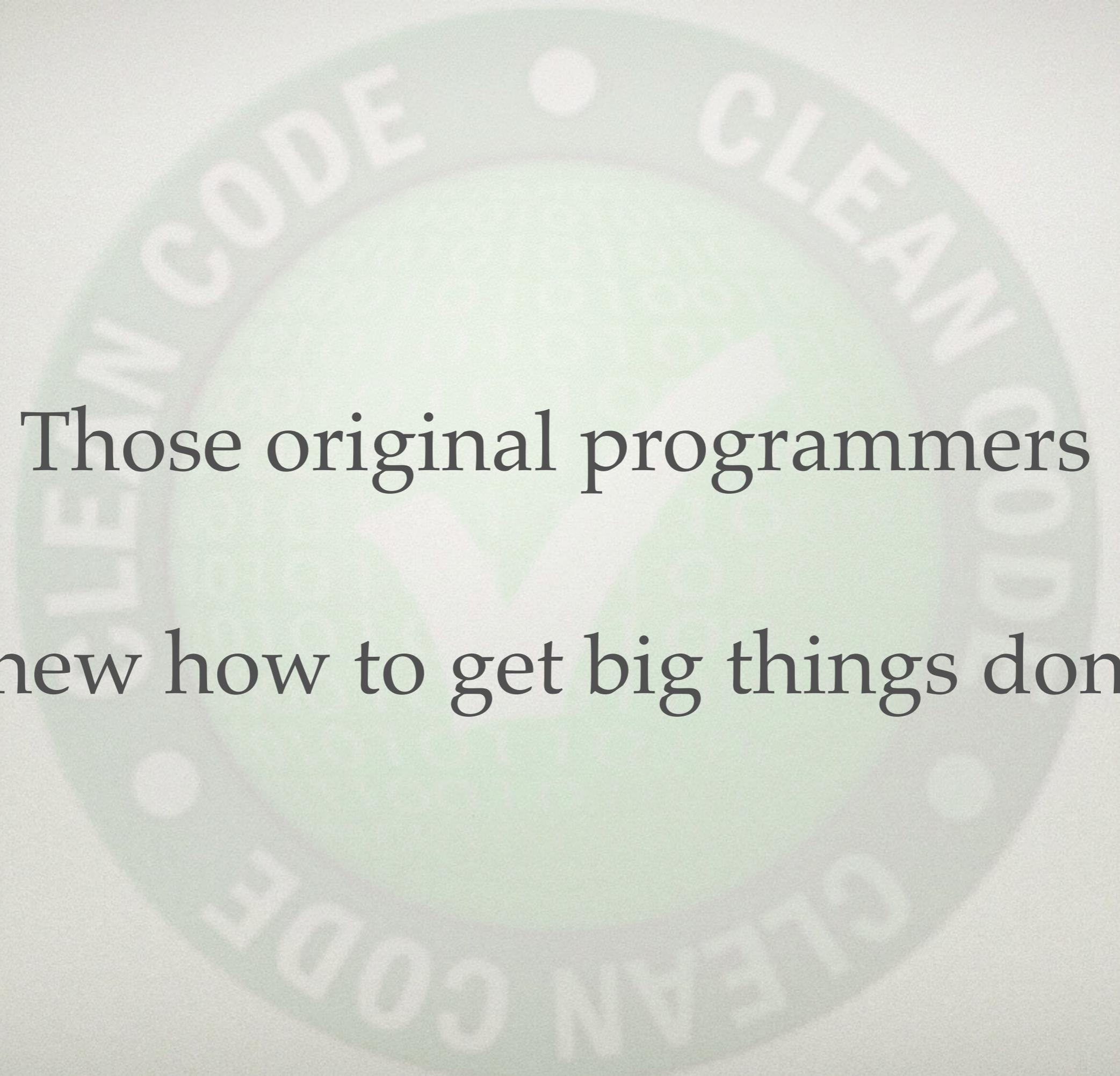


NOW REMEMBER:

- Up to now programmers were disciplined professionals.
- They didn't need a lot of management or process.
- They knew how to manage their time, communicate, and work together.
- They understood deadlines & commitments. What to leave in and what to leave out.

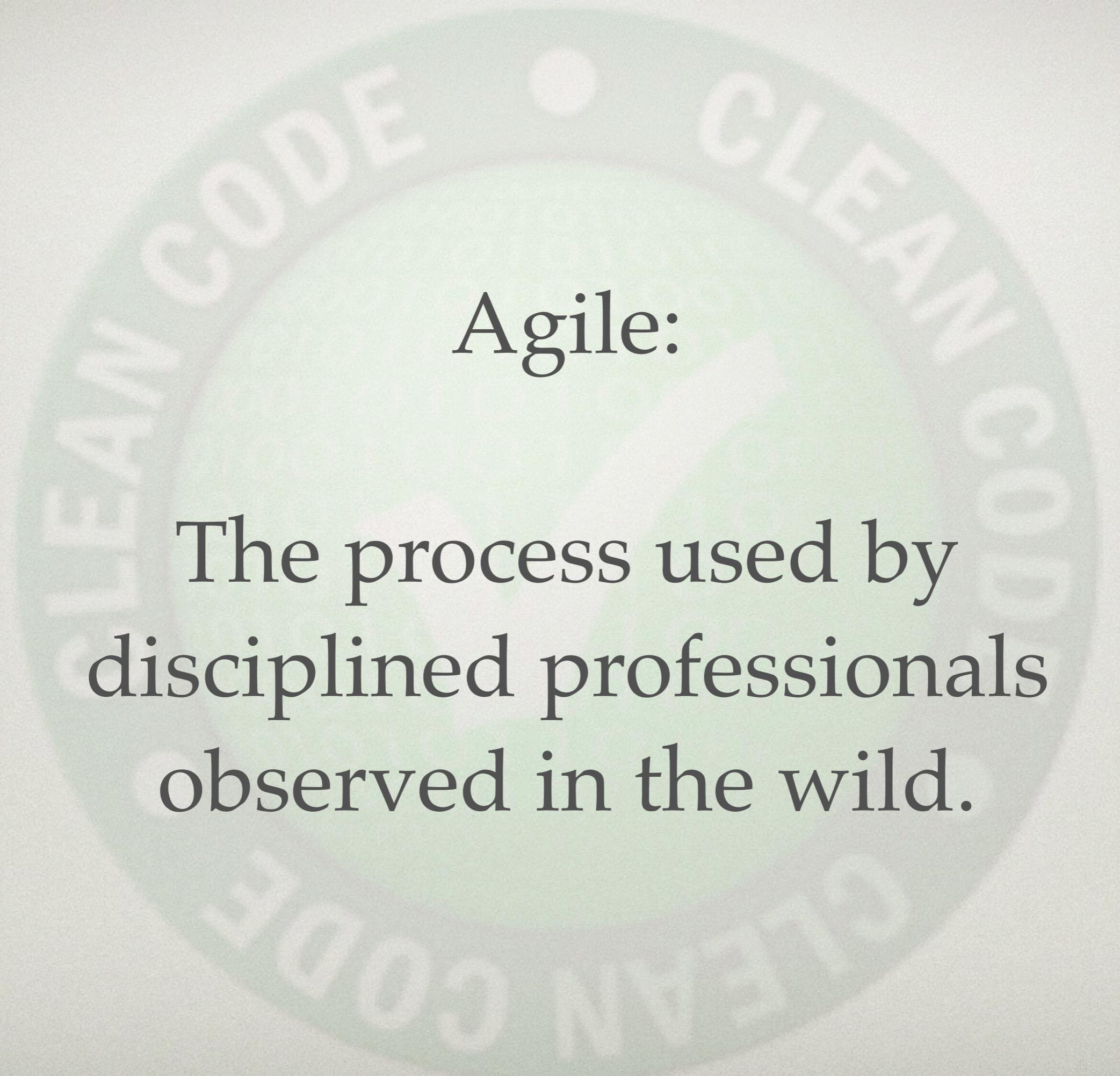
THOSE DISCIPLINED PROFESSIONALS HAD WORKED MIRACLES

- IBM 360 Virtual Memory OS.
- NASA: Mercury, Gemini, Apollo
- Structured, Functional, Object-Oriented.
- Fortran, Cobol, Algol, Lisp, C, Unix.



Those original programmers

Knew how to get big things done.



Agile:

The process used by
disciplined professionals
observed in the wild.

But hoards of young testosterone driven men need discipline imposed upon them from above.

They need close management and a fixed process.

They need:

Waterfall.

LOOKING BACK TO LOOK AHEAD

1945:

None



Process



1970:

Waterfall

LOOKING BACK TO LOOK AHEAD

1970



The Waterfall era



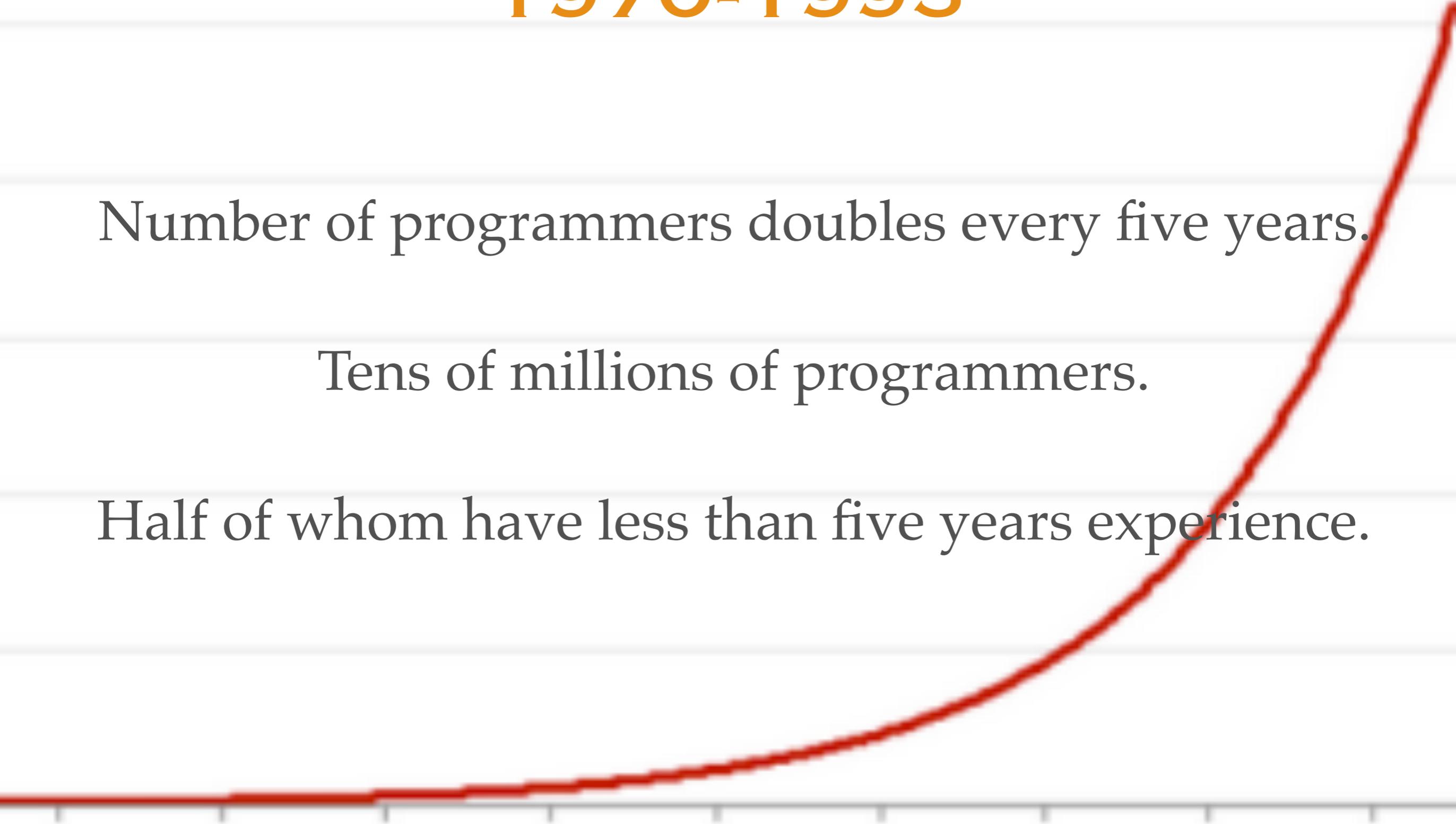
2000

1970-1995

Number of programmers doubles every five years.

Tens of millions of programmers.

Half of whom have less than five years experience.



1995

- Original cohort of disciplined professionals retires.
- The first wave of career programmers comes of age (well over 40).
- We foresee the need for change.

1995

- Scrum: Schwaber, Beedle, DeVos, et. al.
- XP: Beck, Cunningham
- FDD: Coad.
- Crystal: Cockburn

We are uncovering better ways of developing
Software by doing it and helping others do it
Through this work we have come to value:

Individuals and interactions
over Process and tools.

Working Software
over Comprehensive documentation.

Customer Collaboration
over Contract negotiation.

Responding to Change
over following a Plan

That is, while there is value in the items on the right
We value the items on the left more.

2001: Snowbird Agile Manifesto

Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it.

Through this work we have come to value:

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

AGILE REQUIRES DISCIPLINE

- Working in fixed time boxes.
- Estimating in relative units.
- Customer communication.
- Continuous integration.
- Collaboration.
- And so much more.

EXTREME PROGRAMMING

- The most technical disciplines
 - TDD
 - Refactoring
 - Simple Design
 - Acceptance Tests
 - Metaphor

Many of us felt that these technical disciplines were the glue that made the whole agile process work properly.

Without those technical - dare I say

mathematical disciplines,

the code being produced would grow and evolve in ways that made it harder and harder to work with.

"lose track of what we are doing"

BUSINESS UNDERSTANDS DISCIPLINE



BUT BUSINESS DOESN'T UNDERSTAND US.



- So they can't evaluate, endorse, or approve any technical practices.

**WORSE, PROGRAMERS DO
NOT AGREE.**



FLACCID SCRUM



A photograph of a very cluttered desk or workspace. The desk is covered with a large amount of miscellaneous items, including papers, folders, a chair, a desk lamp, and various small objects. The overall appearance is one of disarray and lack of organization.

**An efficient business
discipline coupled to an
undisciplined engineering
team will very rapidly
make a mess.**

AGILE SPLIT

**Agile:
Business Practices**

**Craftsmanship:
Technical Practices**

IRONY

Kent Beck at Snowbird stated a goal for Agile:

*Healing of the divide between
business and programming.*

AGILE SPLIT

**Agile:
Business Practices**

**Craftsmanship:
Technical Practices**

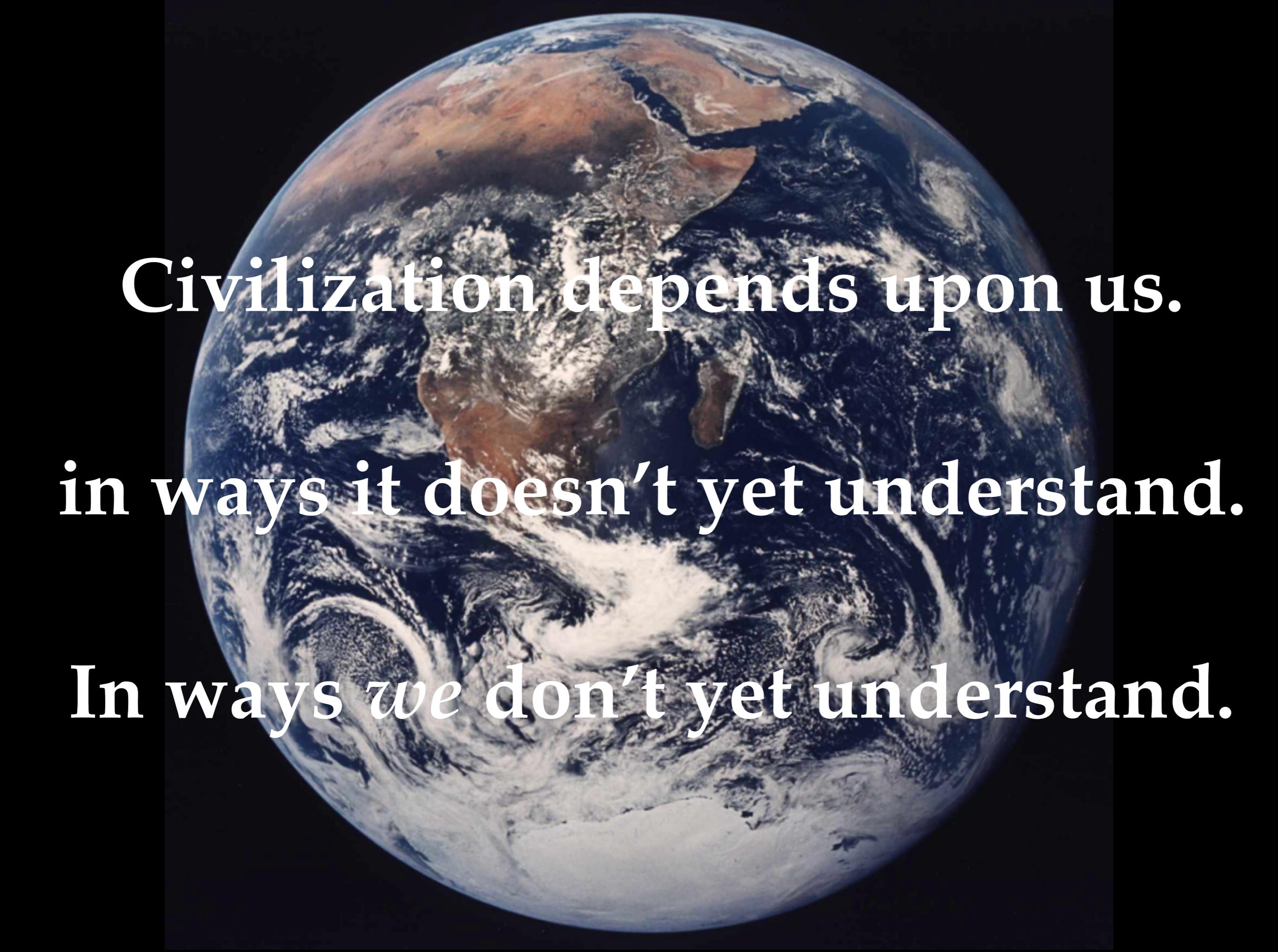


IT'S TIME FOR US TO:

- Grow Up.
- Define our profession.
- Choose our practices and disciplines.
- Reunify Agile / Craftsmanship.

BECAUSE WE ARE HEADED TOWARDS A DISASTER





Civilization depends upon us.
in ways it doesn't yet understand.
In ways *we* don't yet understand.



WE

RULE

THE

WORLD

JUDITH WOODS

Why keeping hubby happy helps women to succeed

Features page 27



JAMES CORDEN

My joy at being part of the funniest play of the year

Arts page 29



ESTHER RANTZEN

Old folk need to get web-wise

Your Money page 30

The Daily Telegraph



Tuesday, November 8, 2011

telegraph.co.uk

Irish Republic €1.15

No 48,658 £1.00

TENS OF THOUSANDS DIE IN SOFTWARE CATASTROPHE

By James Hogg
Deputy Political Editor

THESE MAY was facing fresh questions about her judgment last night after it emerged that she extended a secret relaxation of Britain's border controls without having detailed information about the security implications of the move.

A leaked document shows that in July the Home Secretary authorised UK Border Agency staff not to carry out full checks on the passports of hundreds of thousands of people arriving at British airports and ports last week.

In September, Mrs May extended the scheme - which was never made public - to cover her six weeks, despite having only "very limited information" about the consequences of the change.

The leaked document suggested officials

had been given discretion to let her to relax passport controls without seeking ministerial approval. Last night the Home Office insisted that this was a long-standing measure to allow staff to deal with some queries.

In the House of Commons yesterday, Mrs May came under intense pressure as she was accused by Labour of giving the "green light" to relax border controls and fighting Conservative opposition to her judgment.

She insisted she should be criticised, but admitted that she did not know how many suspected terrorists, criminals and illegal immigrants had been able to enter the country under the relaxed checking system she put in place.

The Daily Telegraph reported yesterday that in July Mrs May ordered the UKBA's Border Force to make the checks applied to people entering Britain with European

passports. As that "pilot scheme" continued, border staff then relaxed the checks applied to non-European passports too.

Mrs May accused Boris Clark, the suspended head of the Border Force, of ordering that second relaxation without proper warning.

"The paper records all those who had submitted that the relaxation of checks that continued was not authorised by me," she told MPs, adding that Mr Clark could face criminal charges for his actions.

"As a result of these relaxed border conditions, we will never know how many people entered the country who should have been prevented from doing so," Mrs May said.

The Home Secretary ordered MPs that under her rules thousands had still been allowed against a warning of suspended criminals and terrorists.

The second relaxation of passport rules



begin at an unknown point during Mrs May's authorised pilot. She said she only knew of it last week when she was informed by senior officials.

Before the pilot was due to conclude in mid-September, Mrs May decided to allow another six-week relaxation of passport rules.

A Home Office official said Mrs May took that decision because of "very limited intelligence" about the pilot in September.

"It was a very limited exercise, so she decided she needed more information," the official said. "There was not enough data, so she extended the pilot."

Mrs May's pilot allowed border officials not to check the electronic chips in modern passports, which contain photographs and other "biometric" data about holders.

Unlike simple photographs, that information is almost impossible to forge. Mrs

May's decision to allow the chips to go unchecked was criticised by Philip Hollobone, a Conservative MP. "I and my own officials would read every biometric chip before checked," he told her.

York Cooper, the Labour shadow home secretary, condemned Mrs May's handling of Britain's borders, telling MPs that the July decision to loosen passport controls had led to the second relaxation.

Mrs Cooper said: "The truth is that instead of a long history of checks over years as all previous ministers had committed to do, this Home Secretary decided to water them down as official government policy, even though she never told the House."

She added: "She has blamed officials for relaxing the checks rather than she intended. But she gave the green light." *Continued on Page 7*

**HOW
COULD
YOU...**



**...HAVE
LET
THIS
HAPPEN?**

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Tuesday, November 8, 2011

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CONGRESS PASSES SWEEPING SOFTWARE REGULATIONS

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In September, Mrs May extended the scheme - which was never made public - to cover her air-sea routes, despite having only "very limited information" about the consequences of the change.

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Mrs May accused Border Force, the operational head of the Border Force, of ordering that second relaxation without proper notice.

"The paper would all show what would happen if the relaxation of checks that continued was not maintained by us," she told MPs, adding that Mr Clark could have contacted her for his advice.

"As a result of these relaxed border conditions, we will never know how many people entered the country who should have been prevented from doing so," Mrs May said.

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THE **FUTURE** OF

1940s



PROGRAMMING



20XX

UNCLE BOB

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cleancoder.com

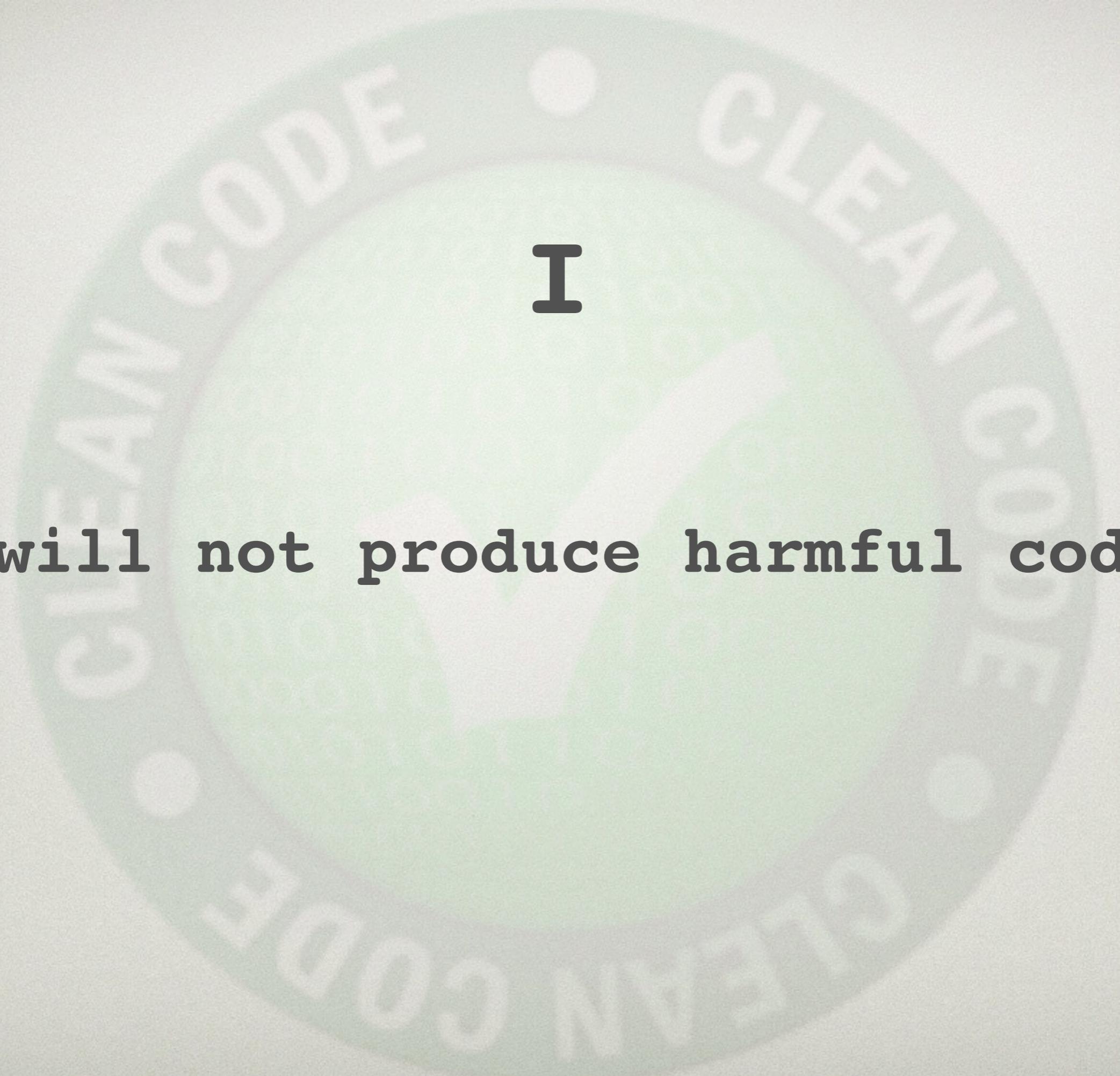
cleancoders.com - Videos

@unclebobmartin



THE PROFESSIONAL'S OATH





I

I will not produce harmful code.

II

**The code that I produce will always
be my best work.**

**I will not knowingly release code
that is defective either in
behavior or structure.**

III

I will provide, with each release, a quick, sure, and repeatable proof that every element of the code works.

IV

I will make frequent, small, releases. I will not impede progress.

V

**I will fearlessly and relentlessly
improve the code at every
opportunity.**

I will never make the code worse.

VI

I will keep productivity high.

**I will do nothing that decreases
productivity.**

VII

I will continuously ensure that others can cover for me, and that I can cover for them.

VIII

I will produce estimates that are honest both in magnitude and precision.

I will not make promises without certainty.

IX

**I will never stop learning and
improving my craft.**