Lockheed Martin Presents

An IEEE Milestone Dedication Event

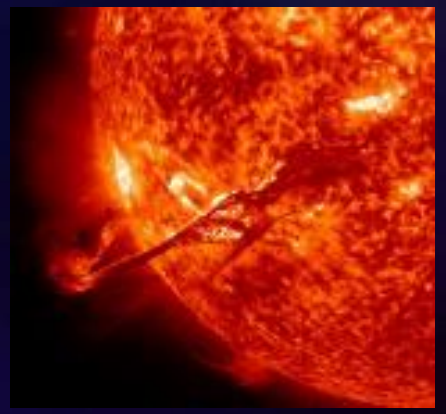
IEEE Milestone:

DIALOG Online Search System, 1966

23 May 2019

IEEE
Advancing Technology for Humanity

WELCOME TO LOCKHEED MARTIN'S ADVANCED TECHNOLOGY CENTER

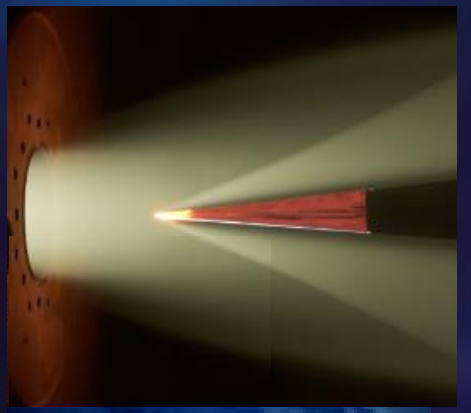


SPACE SCIENCES & INSTRUMENTATION

OPTICS & LASER TECHNOLOGY

AI, DATA ANALYTICS & EXPLOITATION

SPACE SECURITY & COMMUNICATIONS



HYPERSONICS & ADVANCED MATERIALS

IEEE MILESTONE DEDICATION EVENT
DIALOG ONLINE SEARCH SYSTEM
MAY 23, 2019

Welcome from Lockheed Martin Space: Advanced Technology Center (ATC)

- Dr. Nelson Pedreiro, Vice President of the ATC

- Tom Malko, Vice President Engineering & Technology at the ATC

ADVANCED TECHNOLOGY CENTER

IEEE Advancing Technology for Humanity

IEEE: Advancing Technology for Humanity

Keith Moore, IEEE Region 6 Director

The DIALOG Online Search System, 1966

23 May 2019

IEEE
Advancing Technology for Humanity

IEEE at a Glance

Global Reach

422,460 Members

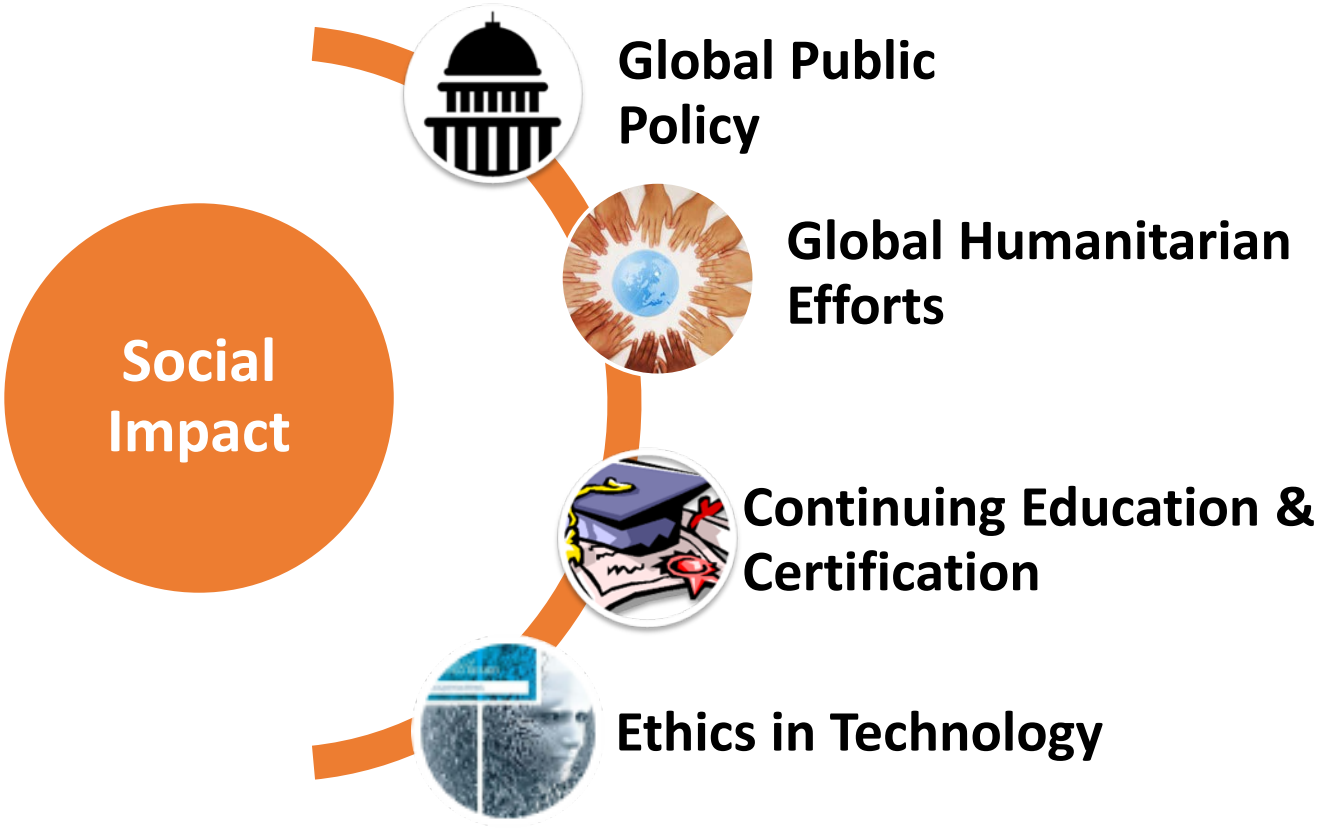
160+ Countries

46 Technical Societies & Councils

123,000 Student Members

Data as of 31 December 2018

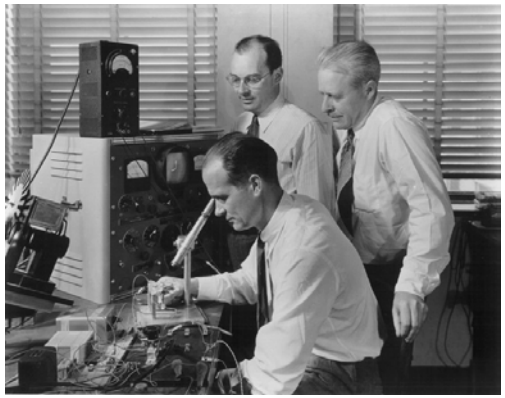
IEEE at a Glance

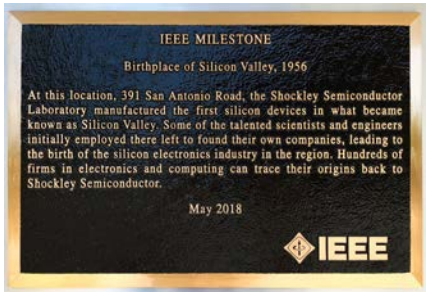


IEEE Milestone Program

Funded by the IEEE Foundation

- Honors significant technical achievements in electrical, electronic, and computer engineering and the associated sciences
- 3 examples:
  - Marconi's Wireless Experiments, 1895 (Italy)
  - Transistor, 1947 (Bell Labs, New Jersey)
  - Compact Disc Player, 1979 (The Netherlands)
- A bronze plaque is installed in an historically important location
- DIALOG milestone:
  - 194th worldwide
  - 16th for the Santa Clara Valley Section
  - 25th for Region 6 (10 western states)





IEEE

The Fuel of IEEE

Who we are

- Forward-thinking technology professionals coming together …

… to discover the next technological innovation,

to develop international standards,

to form communities,

to share research and educate,

in the spirit of collaboration.

www.ieee.org

IEEE at a Glance

Data as of 31 December 2018

IEEE History Center

Key functions

- Preserve, research, and promote the history of IEEE, its members, their professions and industries, and the related sciences and technologies
- Manage the Engineering & Technology History Wiki on behalf of a consortium of engineering societies
- Develop and promote the REACH Program, which provides free history of technology curriculum to pre-university educators

IEEE REACH
Raising Engineering Awareness through the Conduit of History

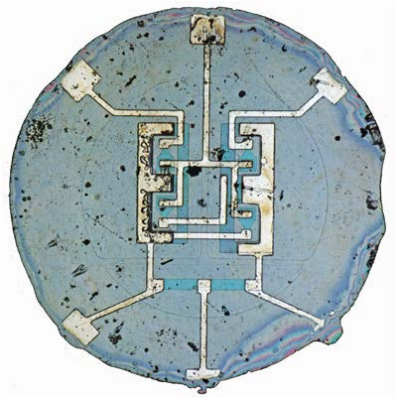
ethw.org

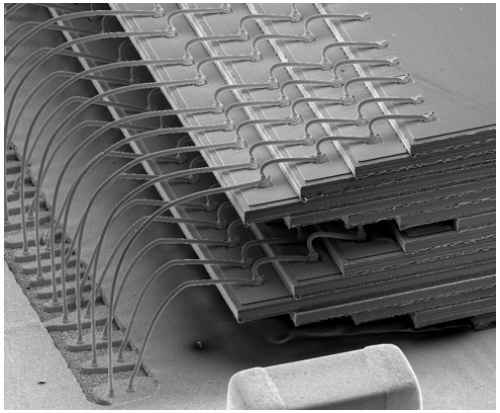
reach.ieee.org

IEEE

IEEE Milestones in the SF Bay Area

VR1000 1956



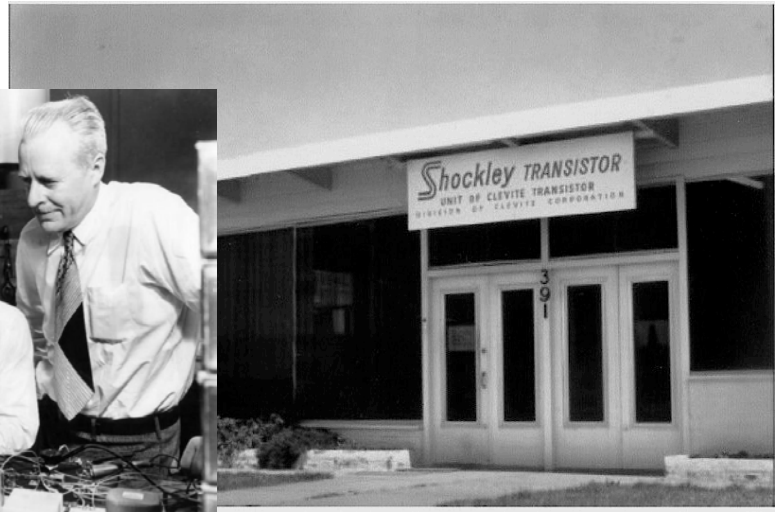


“SHAKEY: The World’s First Mobile, Intelligent Robot, 1972”

SRI International

Milestone: Birthplace of Silicon Valley, 1956

- At Shockley Labs site: corner of San Antonio Rd and California Ave, Mountain View



Birthplace of Silicon Valley: Special Plaque

The Birthplace of Silicon Valley

391 San Antonio Road, Mountain View, California has the distinction of being the epicenter of Silicon Valley's humble beginnings. At a time when semiconductor research and development was being conducted largely in Texas and the East Coast, Shockley Semiconductor Laboratory opened its doors here at this site in 1956. The unique confluence of creative talent, hard work, and financial incentives which developed around this industry in this area led to the moniker "Silicon Valley".

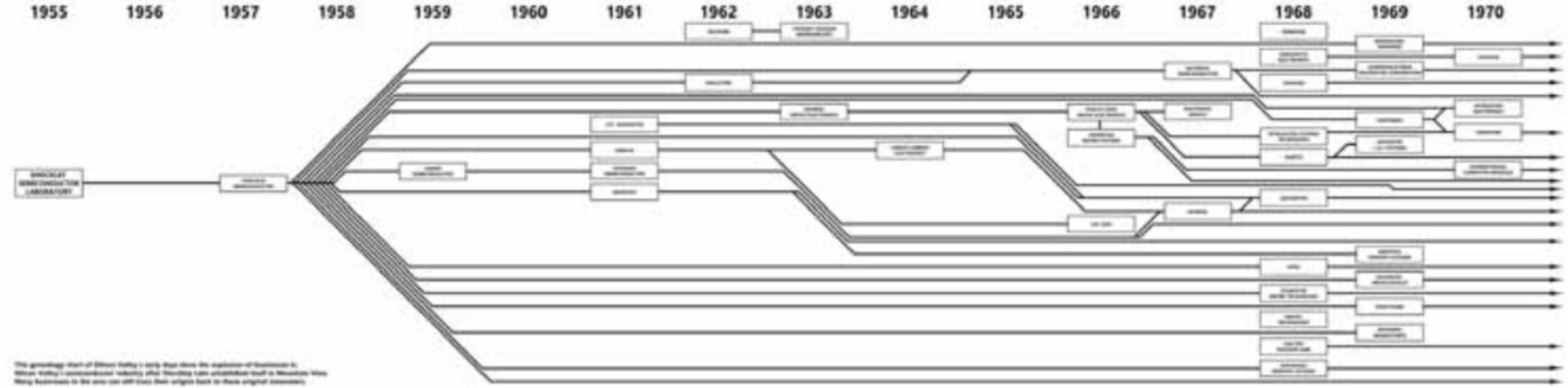
William Shockley, John Bardeen, and Walter Brattain shared the 1956 Nobel Prize in Physics for their 1948 discovery of the transistor effect at Bell Laboratories, leading to Shockley's invention of the junction transistor. Shockley left Bell Labs and formed a partnership with Arnold O. Beckman in 1955 to establish Shockley Semiconductor Laboratory as a division of Beckman Instruments with the intention of developing silicon devices.

A remarkable group of talented young scientists and engineers was recruited by William Shockley from across the United States and beyond. These bright and innovative minds were attracted to the area by the opportunity to work with Dr. Shockley and silicon devices. This is where Shockley's four-layer diode was developed, Silicon Valley's first silicon transistors were made, and emerging silicon processing technologies were developed.

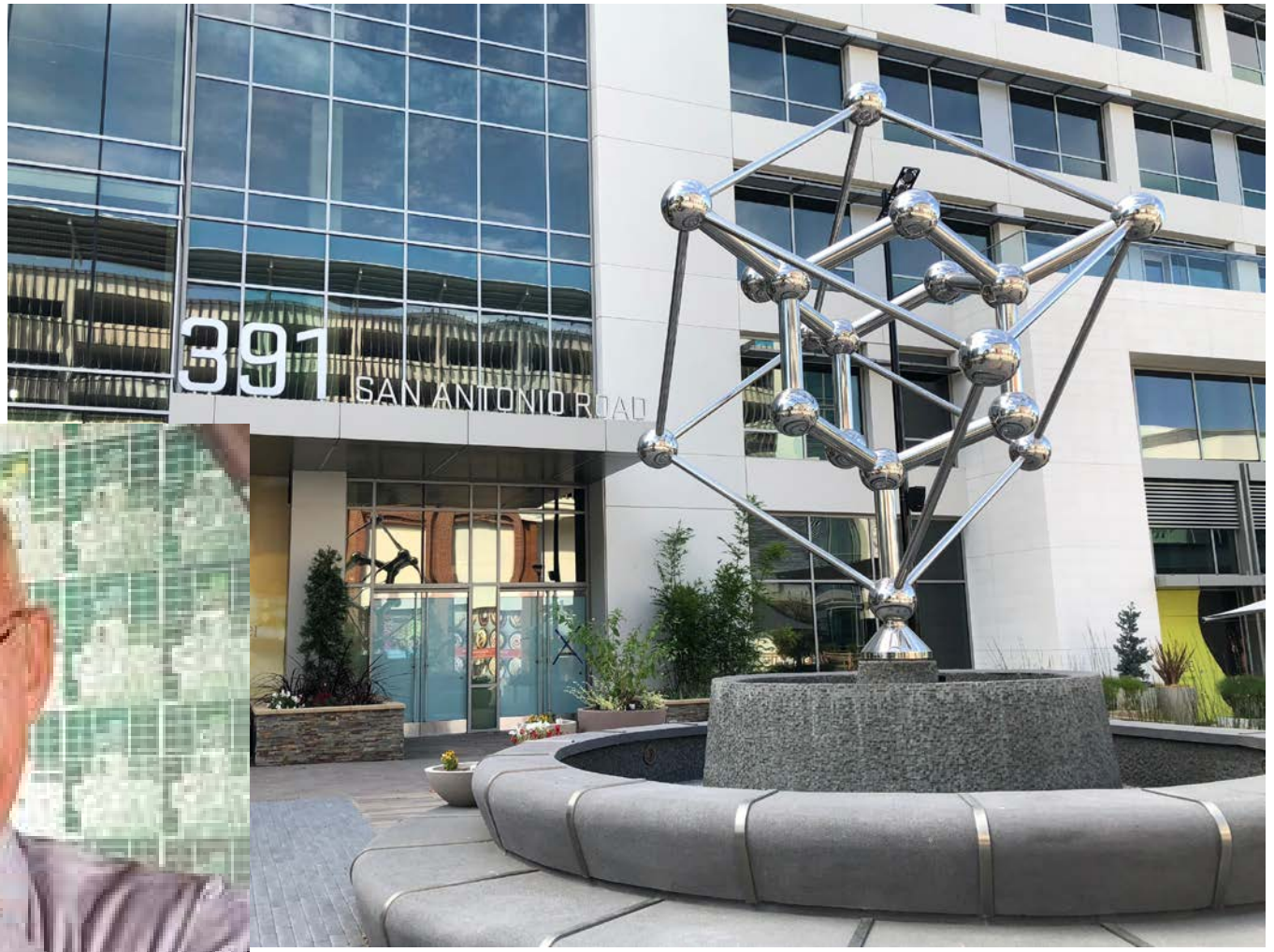
The sculptures located along the sidewalk are monuments to the legacy of Shockley Semiconductor Laboratory in Silicon Valley. The two-pronged sculptures depict Shockley's four-layer diode: one with its protective cap as it would have been produced, the other with its cap removed showing the silicon chip. The third sculpture depicts the 2N696 silicon transistor, one of the first commercially available transistors manufactured in Silicon Valley.

However brilliant Shockley was as a researcher, he was not popular as a manager. In 1957 a group of Shockley Labs' leading staff left to form their own business in nearby Palo Alto. Shockley had placed the importance of the silicon four-layer diode above that of silicon transistor research – a move that did not have the support of this group. The departed group founded Fairchild Semiconductor and within months had successfully brought an advanced silicon transistor to market. Shockley doubted the future success of these men, sometimes referred to as "The Traitorous Eight", but was proven wrong as Fairchild Semiconductor became one of the most well-known success stories of the Silicon Valley.

The gifted young scientists and engineers that Shockley gathered here at 391 San Antonio Road became the driving force behind the spirit of ingenuity and entrepreneurship for which the area is known today. Decades on, Silicon Valley continues to be a mecca of risk-taking, forward-thinking, and technological innovation.

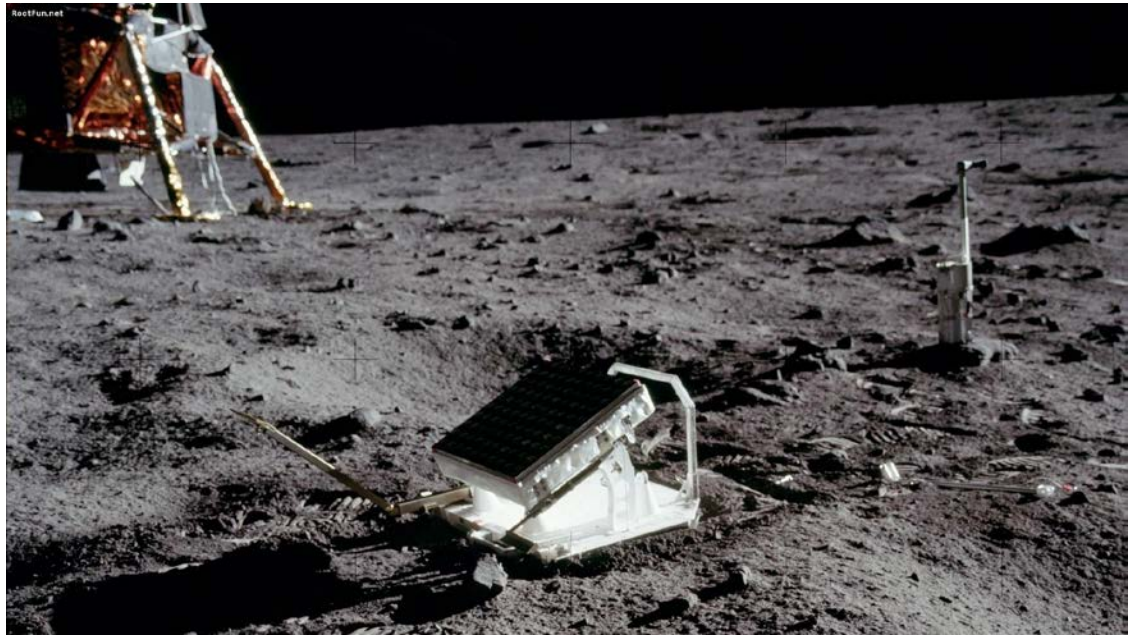


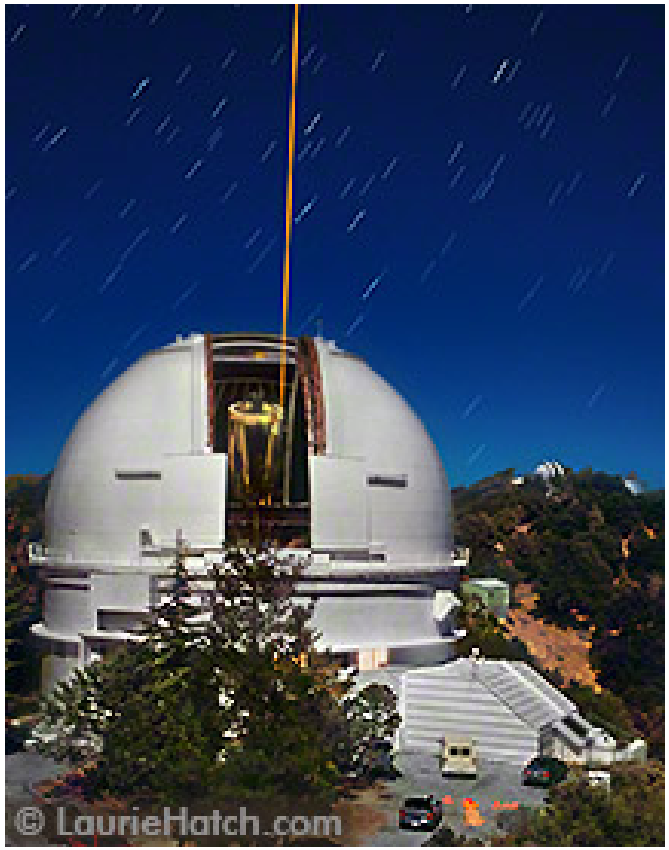
IEEE Milestone: Moore's Law, 1965



Upcoming IEEE Milestone

- Lunar Laser Ranging Experiment, 1969
  - Apollo 11 crew left a retro-reflector on the moon to allow measurement of the distance to the moon by 1.2 GW laser
  - Crews worked on Haleakala, at Lick Observatory and at McDonald Observ.
  - First success: Aug. 1, 1969 at Lick



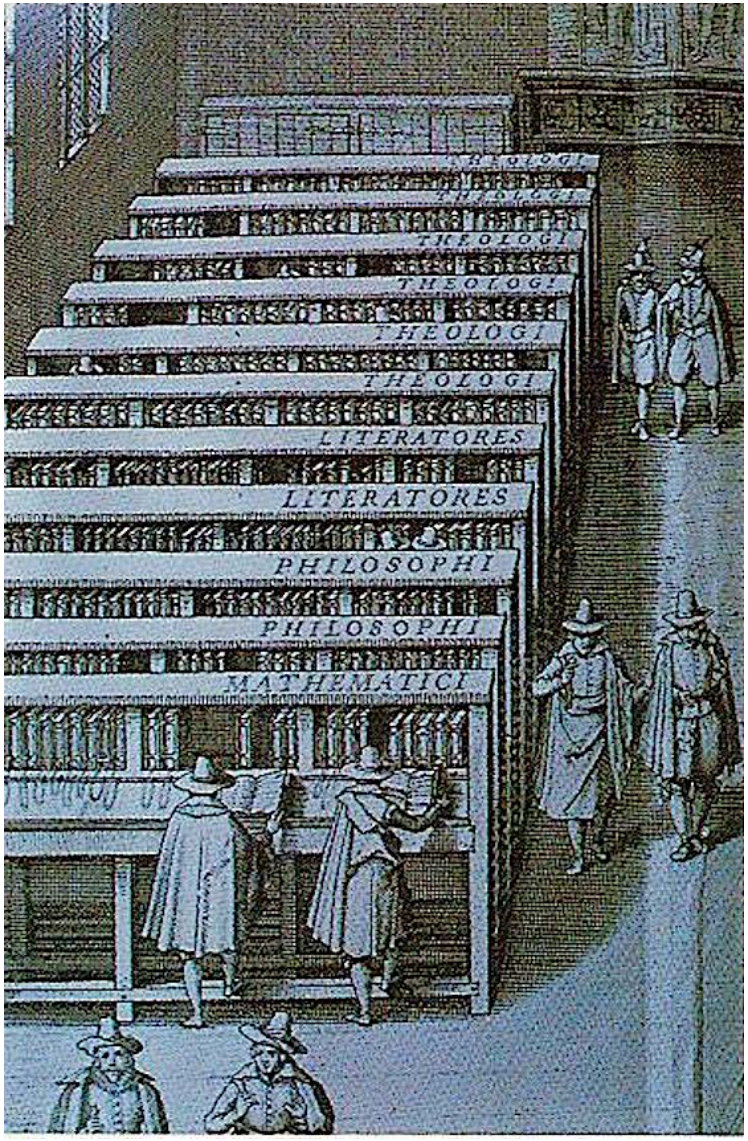


Proposing Milestones

- Got an idea? Let Brian Berg (R6 History Chair and Milestone Coordinator) know
  - 

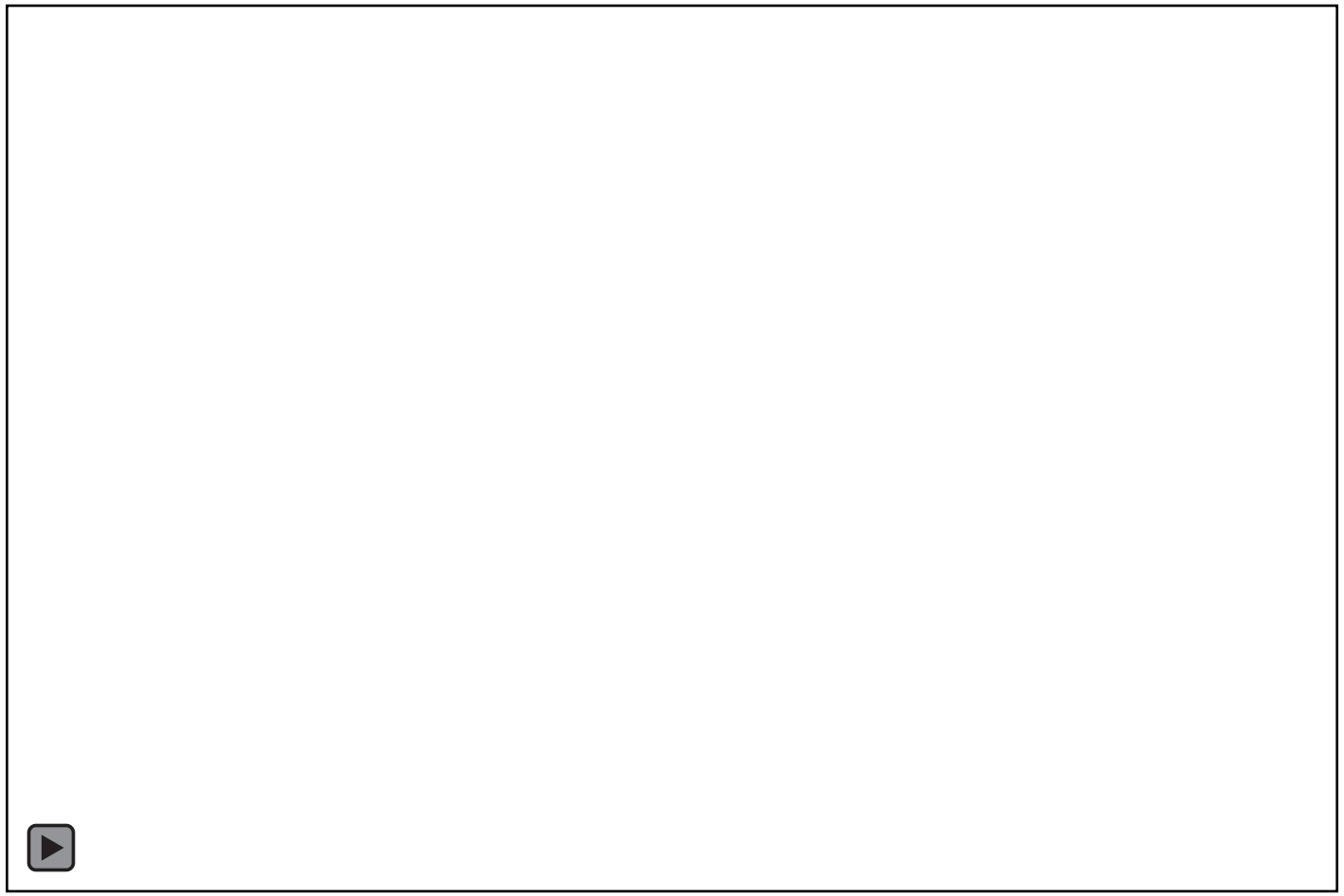
Dr. Roger Summit, DIALOG founder and Chairman Emeritus

“Way Back” Library

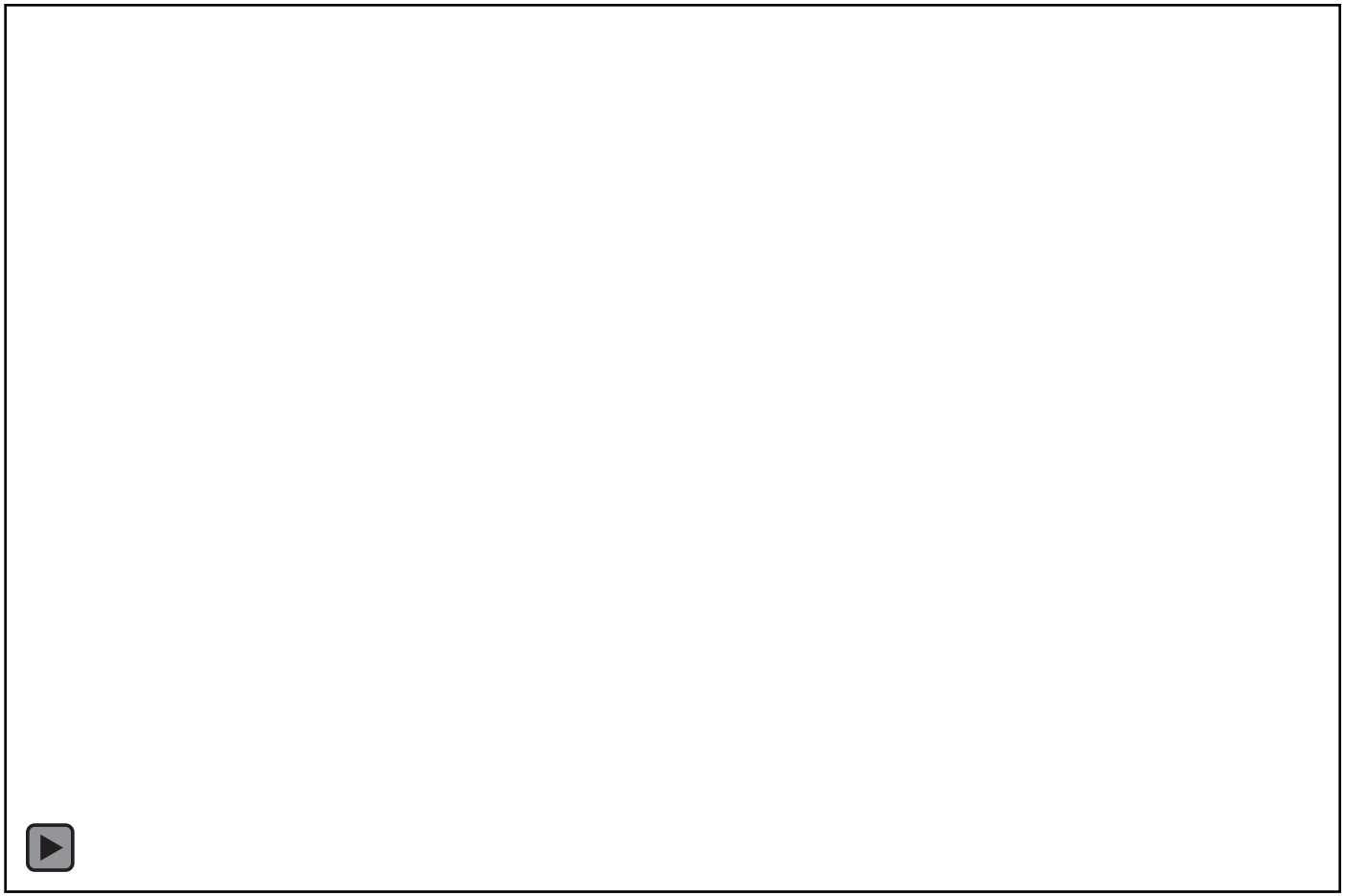


(1)

1969: European Space Research Organization (ESRO) Search Before Digital Automation [Video]



1969: ESRO: Search With DIALOG [Video]



IBM 360 Model 30

(3)

Dialog Search Example

Search topic of interest: _
Library Schools' Use of Distance Education for MLIS Degrees

Person types: **SELECT** library(W)school? and distance(w)education and MLIS

Computer responds: **SET 1 20 LIBRARY(W)SCHOOL? AND DISTANCE(W)EDUCATION AND MLIS**
1567 LIBRARY(W)SCHOOL
8206 DISTANCE(W)EDUCATION
2715 MLIS

Person types: **TYPE Set 1**

Computer responds: **Investigating Evaluation Procedures for Distance Learning MLIS Degrees**

(title results 2-20 omitted

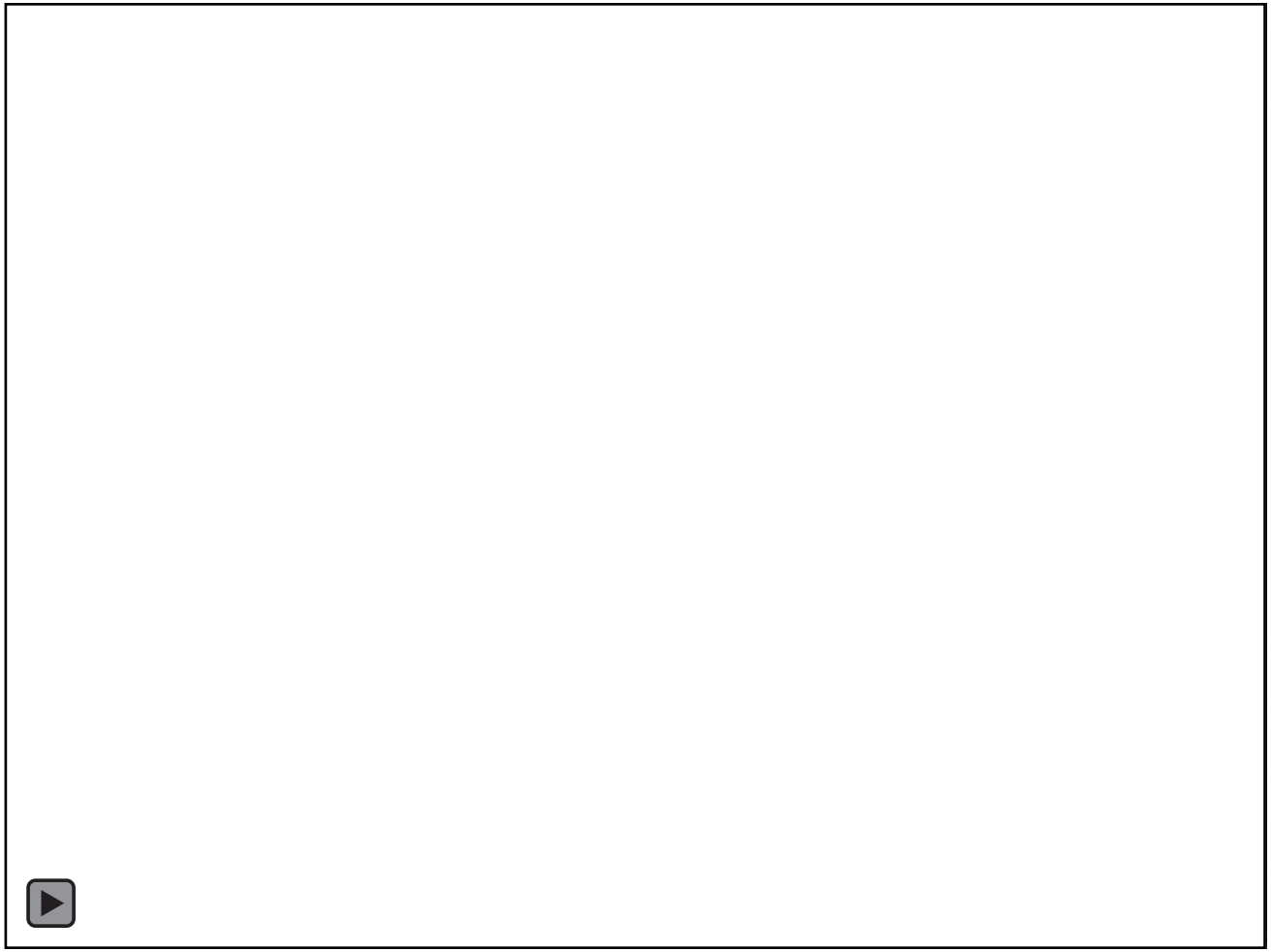
Person types: ***SELECT*** *Set 1 and (distance(w) education OR distance(w)learning)*

Computer responds: ***SET 2 28 SET 1 AND (DISTANCE(W)EDUCATION OR DISTANCE(W)LEARNING)***
20 SET 1
9423 (DISTANCE(W)EDUCATION OR DISTANCE(W)LEARNING)

User types: ***TYPE*** *Set 2*

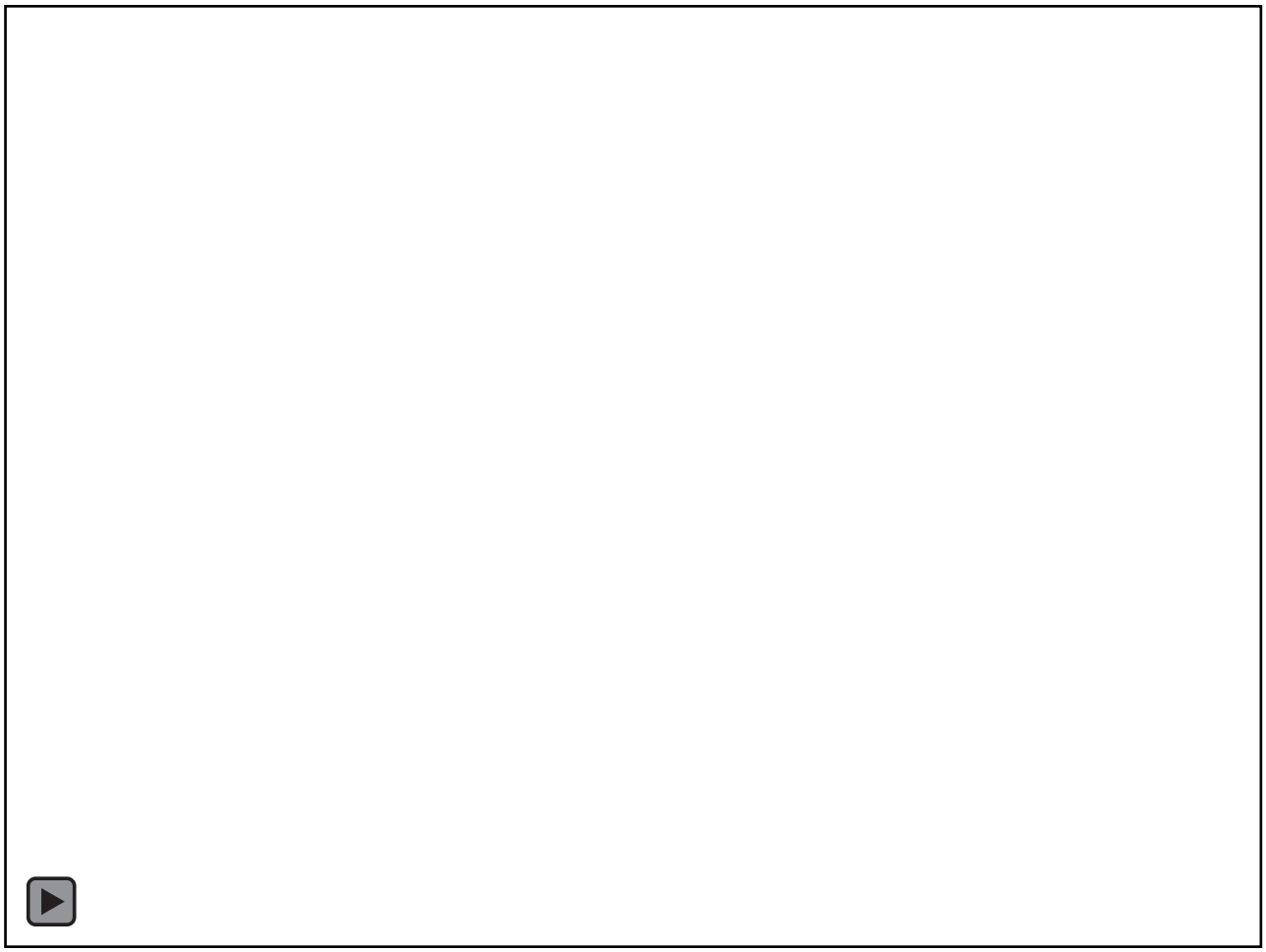
(Search results are printed out)

NASA's Mel Day on Batch Search [Video]



(5a)

NASA's Mel Day: An Interactive System Was Needed; Dialog's NASA RECON System [Video]



(5b)

Early 300 Baud Search Terminal

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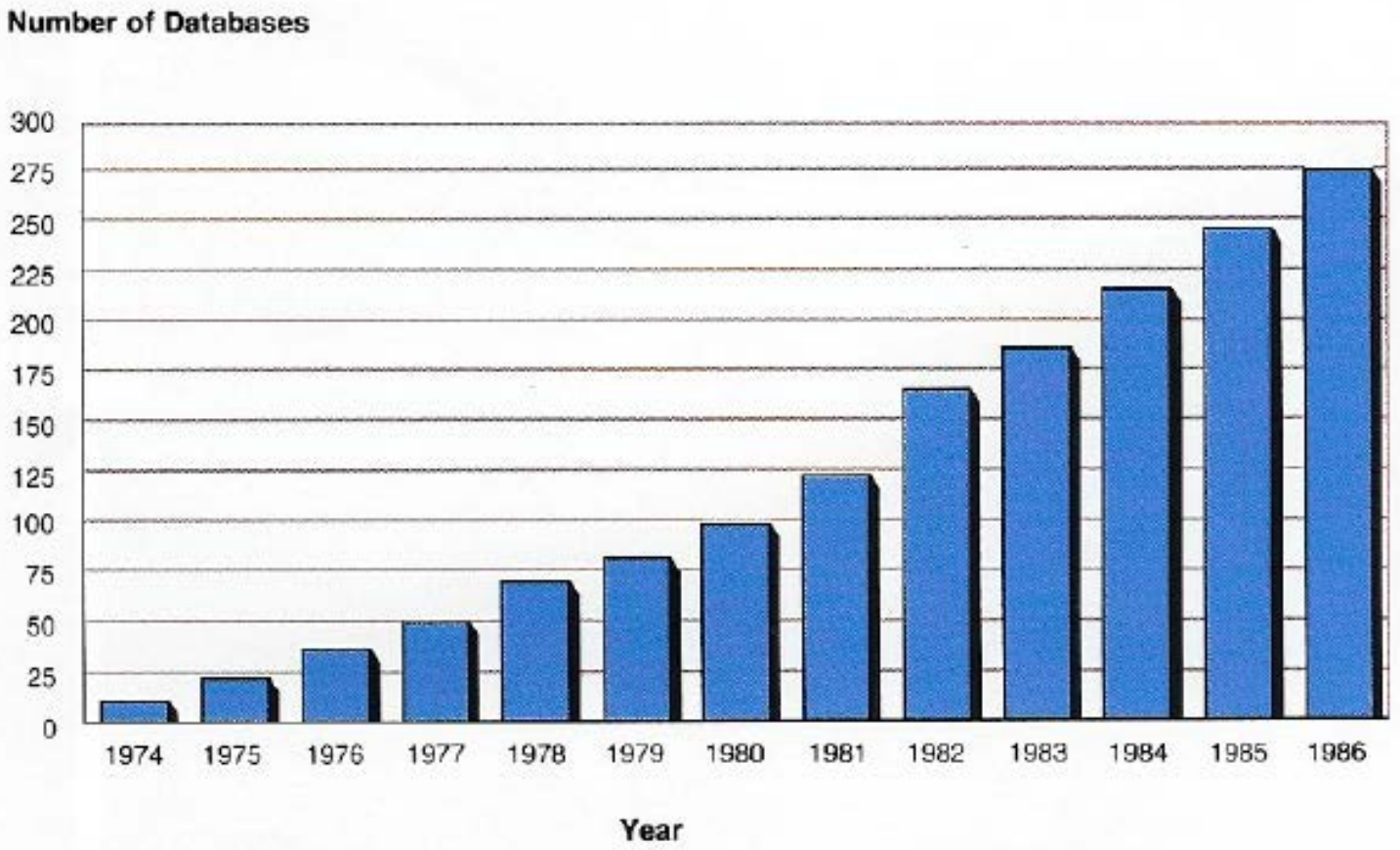
Early DIALOG Employees

Growth of Databases from 1972 to 1986



With the 30 new databases added in 1986, Dialog has again demonstrated significant growth, maintaining Dialog as the premier and largest online source of the world's knowledge.

DIALOG Indexes the Societies

DIALOG Function Heads

Service Flowchart

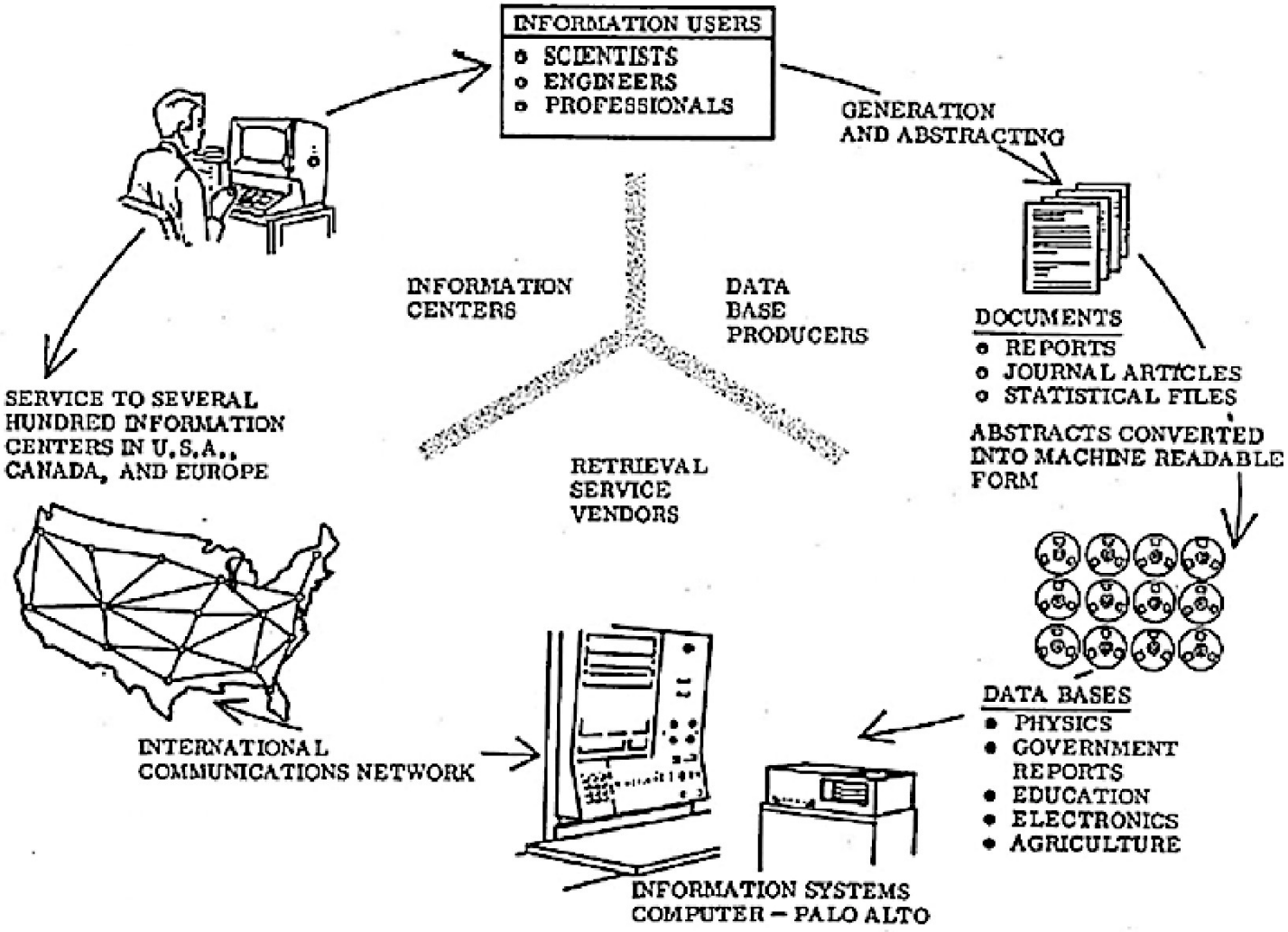


Figure 1. Information Retrieval Services Industry

DIALOG: Early Years

Small number of users
Small files with monthly updates of new records
Only 1 command was processed at a time
Searcher only active during US business day

Small development staff and punch card
Computer time availability was afternoon and evenings

Goal was to reduce disk space and add new data

(10)

DIALOG: Middle Years

Rapidly growing number of searchers
Existing files growing is size
Maximum record size rapidly growing
Growing number of files, some with weekly updates
Some updates replace existing records
Searchers active all day

Growing development staff with terminals
Computer time availability was afternoon and evenings

Goal was to improve the update processing

(11)

DIALOG: Later Years

Rapidly growing number of searchers
Existing files growing is size
New ability to search many databases simultaneously
Growing number of files, some with daily updates

Limited computer time available
No budget available for a 2nd CPU upgrade in a year

Goal was to improve the Search processing

(12)

IBM 360 Model 30

(13)

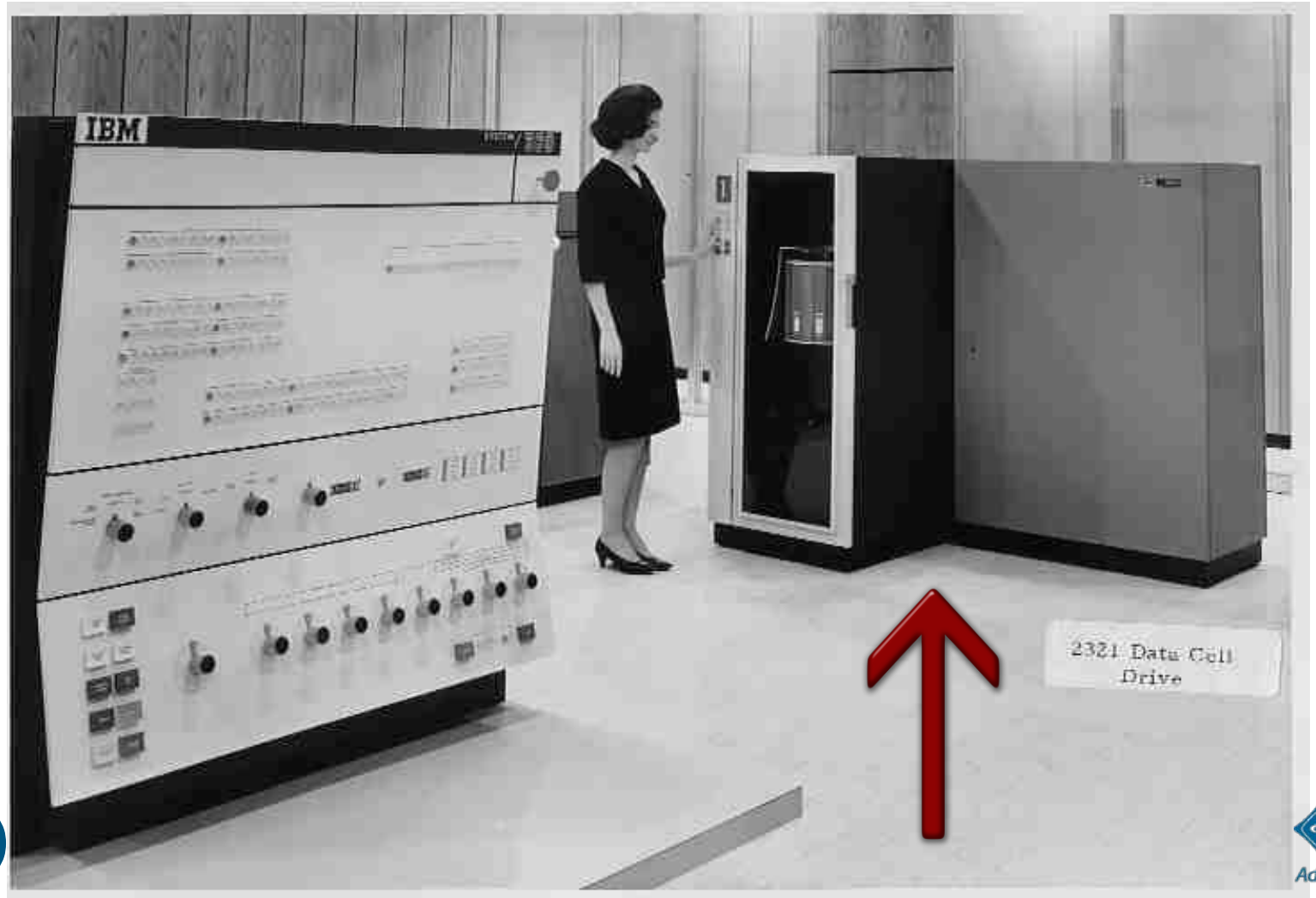
Punched Card Deck

IBM 2311 Disk Drive

(15)

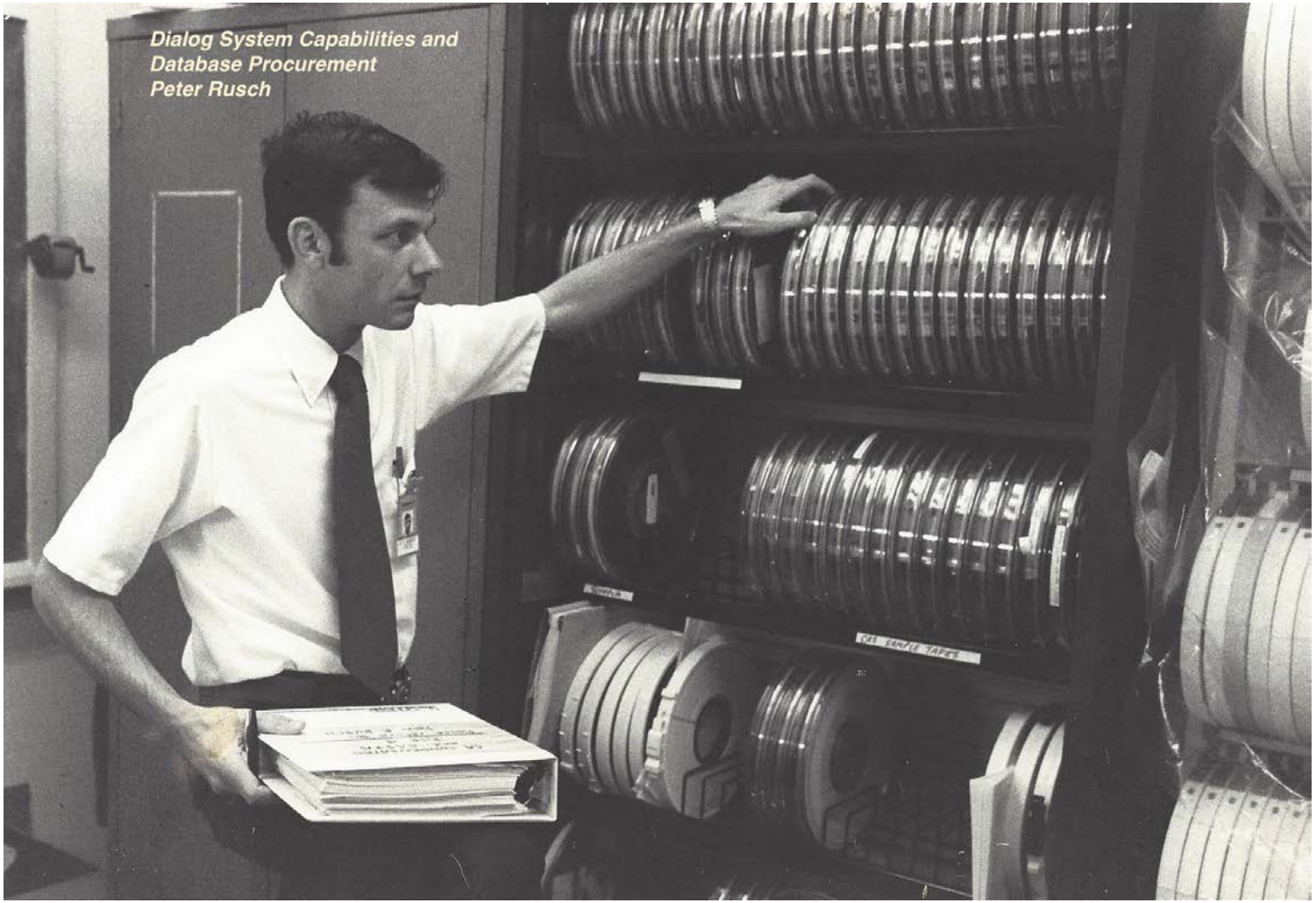
IBM 2321 Data Cell @ 400 MB, 1 sec. access time

(By 1980 we had about 28 of them, for 11.2 GB of storage)



(16)

Tape Library



Computer Room After Move

(18)

“Disk Acres”

(19)

Ground Breaking

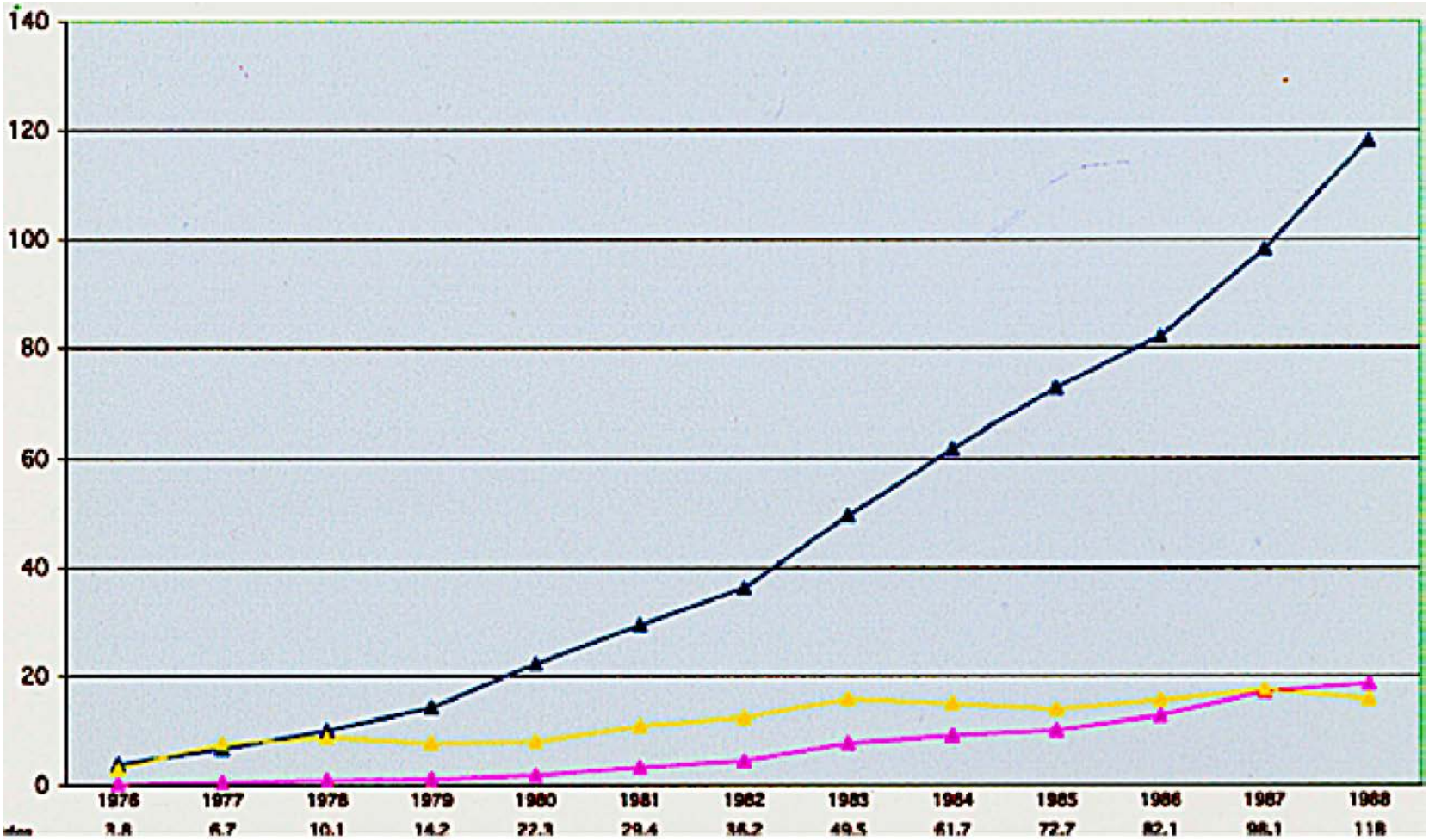
1987: Dialog's 300 Employees

(21)

1988: Incorporation Congrats from Bob Fuhrman (sale via Goldman-Sachs Auction)

(22)

Revenue and Profit Growth: 1976-1988



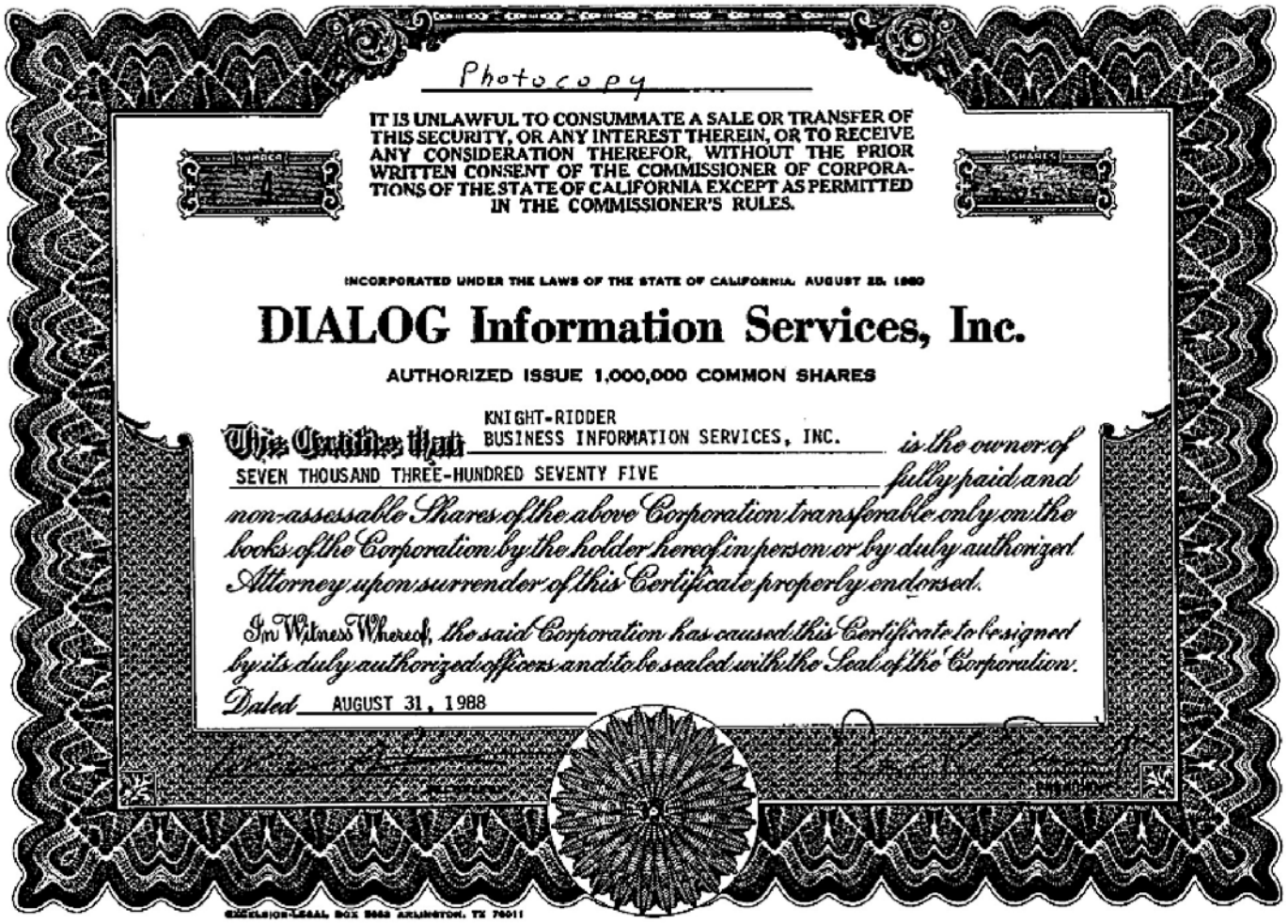
(23)

KRI (Knight-Ridder) Contract Signing: 1988

Lockheed Corp. Vice President Jerry Van Schaick, left, Dialog President Roger Summit, KRI President and CEO Jim Batten and BIS President David Ray prepare to sign the purchase agreement.

(24)

DIALOG Sale Stock to Knight-Ridder Information Services: 1988



Photocopy

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INCORPORATED UNDER THE LAWS OF THE STATE OF CALIFORNIA. AUGUST 25, 1980

DIALOG Information Services, Inc.

AUTHORIZED ISSUE 1,000,000 COMMON SHARES

This Certifies that KNIGHT-RIDDER BUSINESS INFORMATION SERVICES, INC. is the owner of SEVEN THOUSAND THREE-HUNDRED SEVENTY FIVE fully paid and non-assessable Shares of the above Corporation transferable only on the books of the Corporation by the holder hereof in person or by duly authorized Attorney upon surrender of this Certificate properly endorsed.

In Witness Whereof, the said Corporation has caused this Certificate to be signed by its duly authorized officers and to be sealed with the Seal of the Corporation.

Dated AUGUST 31, 1988

EXCELSIOR LEGAL, BOX 9668 ARLINGTON, TX 76011

(25)

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Elizabeth Trudell and Barbara Anderson

(26)

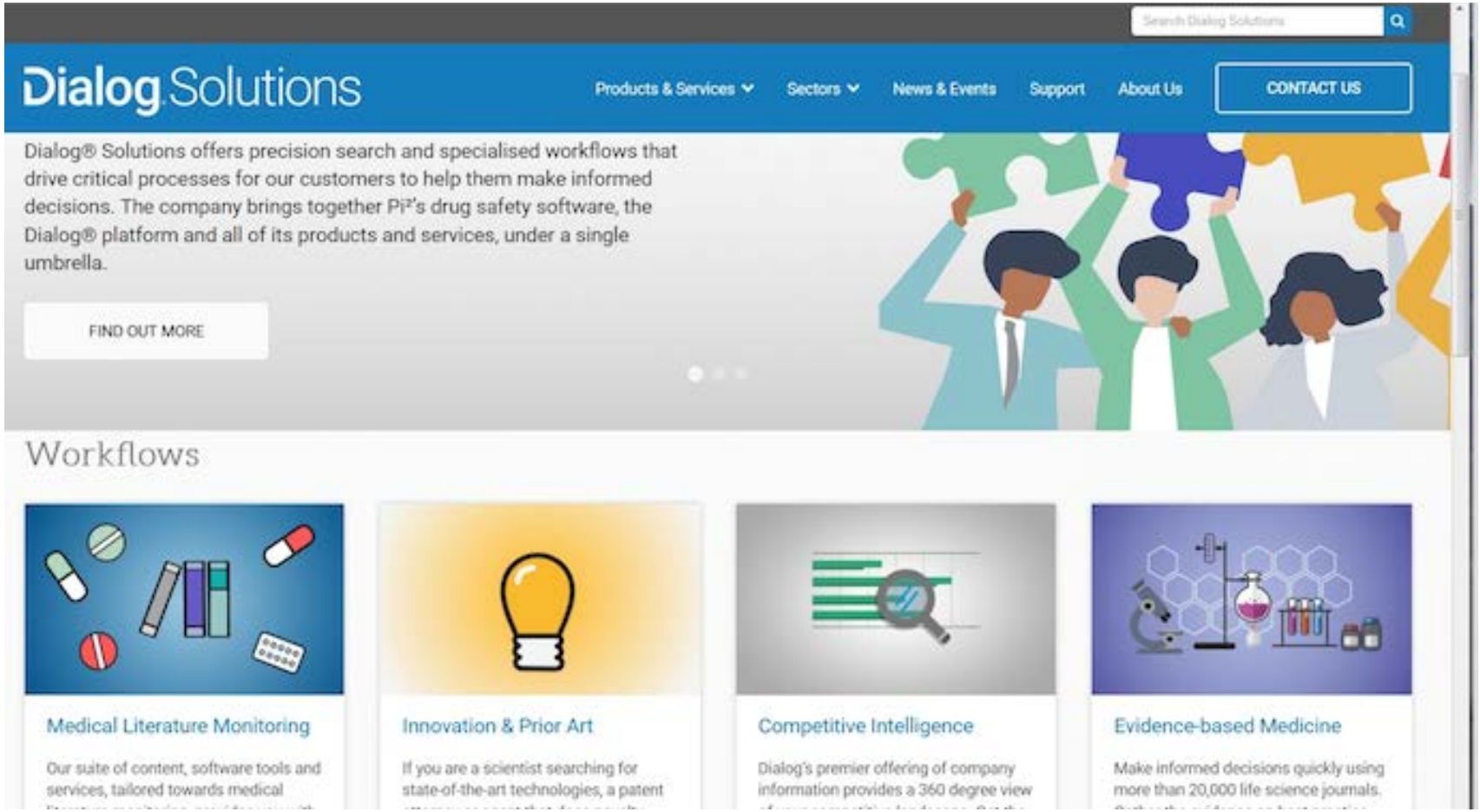
Knight-Ridder Additions

(27)

Announcing ProQuest Dialog at SLA 2013

Audrey Marcus (PQD Product Director)
and Elizabeth Trudell

Dialog Solutions



Margie Hlava:
Access Innovations, Inc.

Access Innovations Featured on Worldwide Business with Kathy Ireland

(30)

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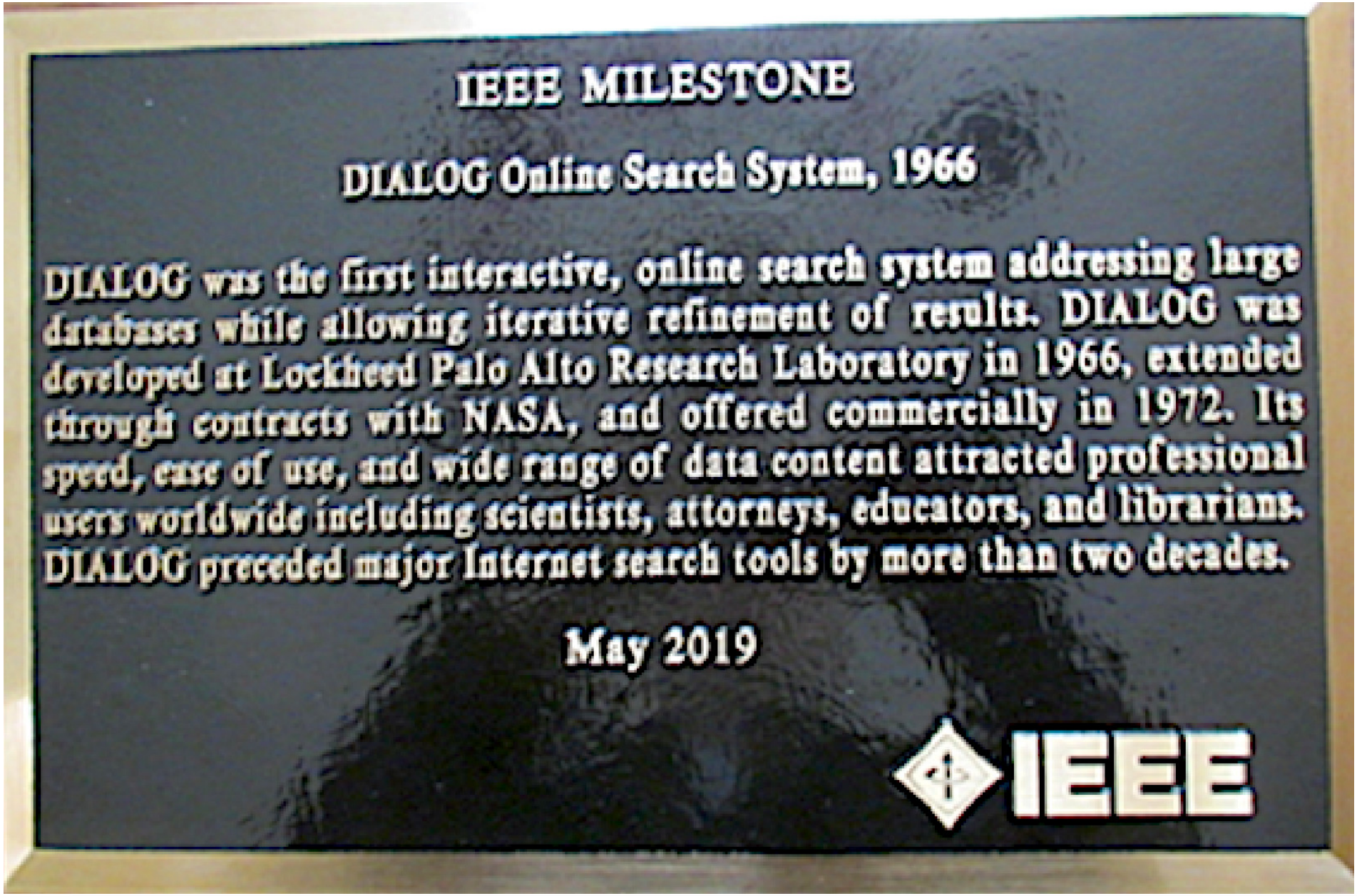
DIALOG: *Transforming Human/Computer Interaction*

Dialog's biggest technical innovation is reflected in the name: it enabled a conversation between the computer and the user

- For the first time, users could enter a search query, receive a response back from the system, expand or narrow the query and immediately view results

"Search at it's best is a conversation…an iterative, interactive process where we find we learn."

-- Peter Morville, Search Patterns, p. 9


IEEE MILESTONE
DIALOG Online Search System, 1966
DIALOG was the first interactive, online search system addressing large databases while allowing iterative refinement of results. DIALOG was developed at Lockheed Palo Alto Research Laboratory in 1966, extended through contracts with NASA, and offered commercially in 1972. Its speed, ease of use, and wide range of data content attracted professional users worldwide including scientists, attorneys, educators, and librarians. DIALOG preceded major Internet search tools by more than two decades.
May 2019
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