NMC Horizon Report

2015 Higher Education Edition

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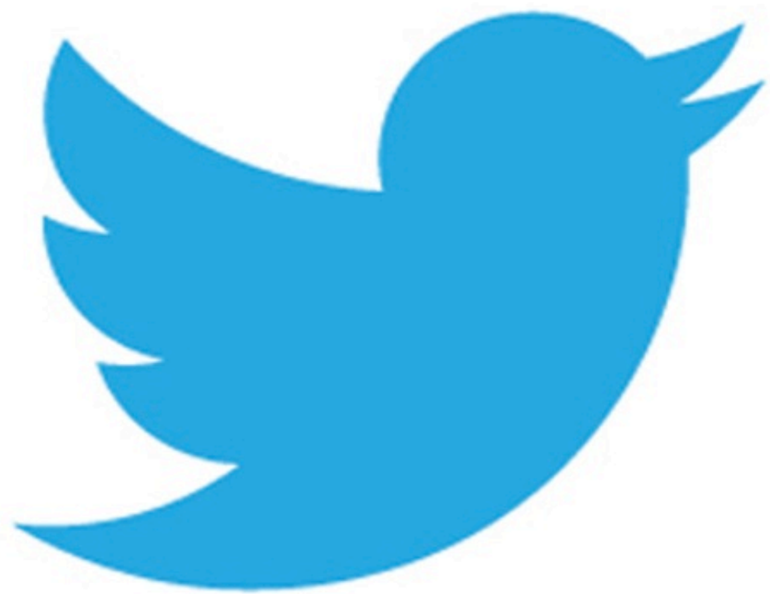

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The NMC Horizon Project

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14 Years of Global Research into Emerging Technology Uptake

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The Neuromancer
William Gibson

The future is already here

It is just unevenly distributed

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Sección
Estante
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Estante
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Seven Challenges of Leadership

Political and other realities in uncertain times

Attracting and retaining top students and faculty

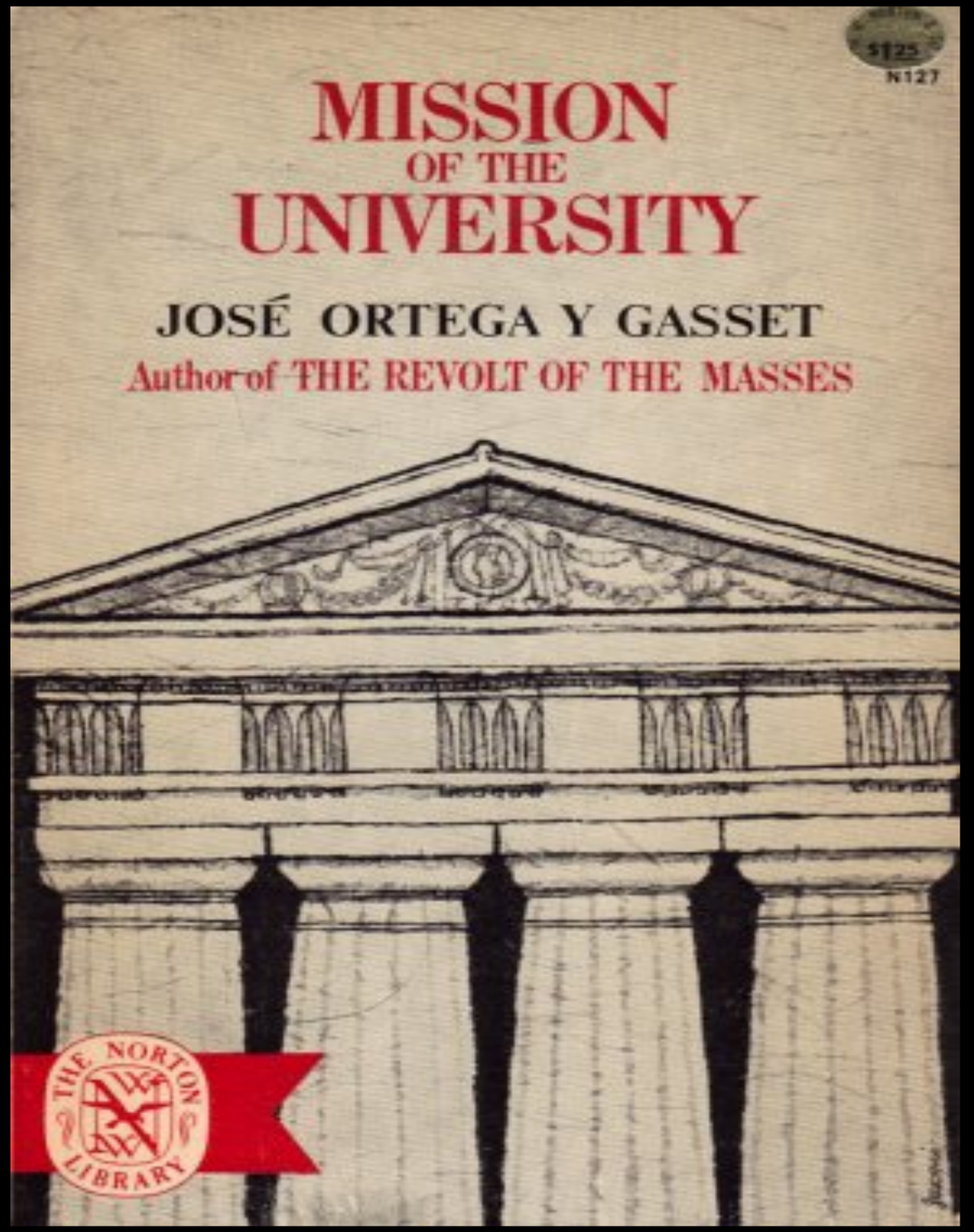
Shifting mission and focus

Private sector competition

Differentiation

Shared governance and transparency

Changing demographics and needs of students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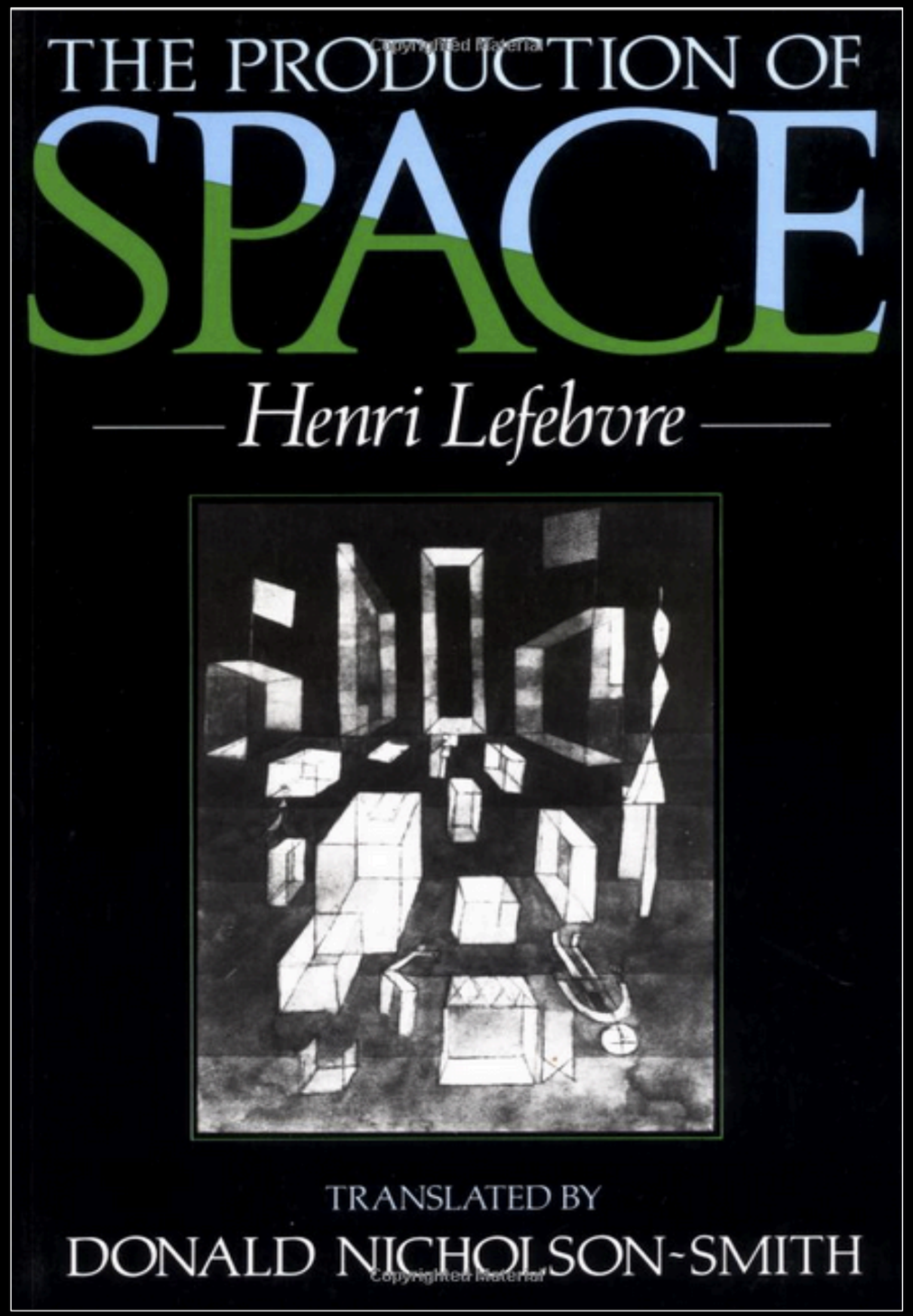
Conserve

Create

Pass On

Knowledge



le conçu

le perçu

le vécu

Conceived

Perceived

Space

Lived

Conceived

Perceived

Time

Lived

Transfer

Practice

Purpose

Create

A smart learning environment …

Does not add unneeded complexity to, nor impede learning

Includes frictionless access to relevant tools and analytics

May be physical, virtual, or unencumbered by either

Provides access to multiple learning streams and pedagogies

Measures learning as it happens

Personalizes learning

Gets smarter with use

7 things

The experts look ahead

Cramming more components onto integrated circuits

With unit cost falling as the number of components per circuit rises, by 1975 economics may dictate squeezing as many as 65,000 components on a single silicon chip

By Gordon E. Moore

Director, Research and Development Laboratories, Fairchild Semiconductor division of Fairchild Camera and Instrument Corp.

The future of integrated electronics is the future of electronics itself. The advantages of integration will bring about a proliferation of electronics, pushing this science into many new areas.

Integrated circuits will lead to such wonders as home computers—or at least terminals connected to a central computer—automatic controls for automobiles, and personal portable communications equipment. The electronic wristwatch needs only a display to be feasible today.

But the biggest potential lies in the production of large systems. In telephone communications, integrated circuits in digital filters will separate channels on multiplex equipment. Integrated circuits will also switch telephone circuits and perform data processing.

Computers will be more powerful, and will be organized in completely different ways. For example, memories built of integrated electronics may be distributed throughout the machine instead of being concentrated in a central unit. In addition, the improved reliability made possible by integrated circuits will allow the construction of larger processing units. Machines similar to those in existence today will be built at lower costs and with faster turn-around.

Present and future

By integrated electronics, I mean all the various technologies which are referred to as microelectronics today as well as any additional ones that result in electronics functions supplied to the user as irreducible units. These technologies were first investigated in the late 1950's. The object was to miniaturize electronics equipment to include increasingly complex electronic functions in limited space with minimum weight. Several approaches evolved, including microassembly techniques for individual components, thin-film structures and semiconductor integrated circuits.

Each approach evolved rapidly and converged so that each borrowed techniques from another. Many researchers believe the way of the future to be a combination of the various approaches.

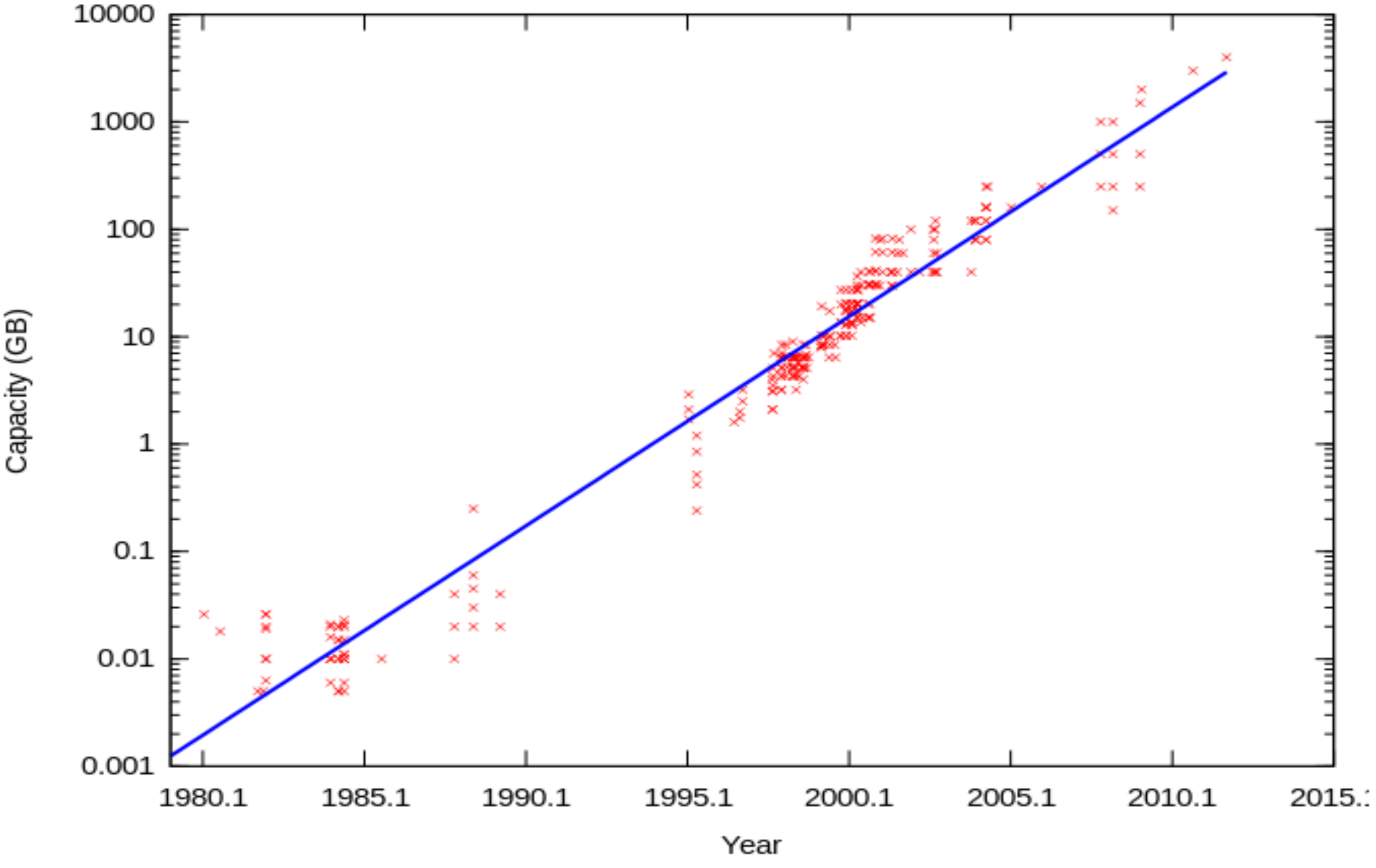
The advocates of semiconductor integrated circuitry are already using the improved characteristics of thin-film resistors by applying such films directly to an active semiconductor substrate. Those advocating a technology based upon films are developing sophisticated techniques for the attachment of active semiconductor devices to the passive film arrays.

Both approaches have worked well and are being used in equipment today.

The author

Dr. Gordon E. Moore is one of the new breed of electronic engineers, schooled in the physical sciences rather than in electronics. He earned a B.S. degree in chemistry from the University of California and a Ph.D. degree in physical chemistry from the California Institute of Technology. He was one of the founders of Fairchild Semiconductor and has been director of the research and development laboratories since

Electronics, Volume 38, Number 8, April 19, 1965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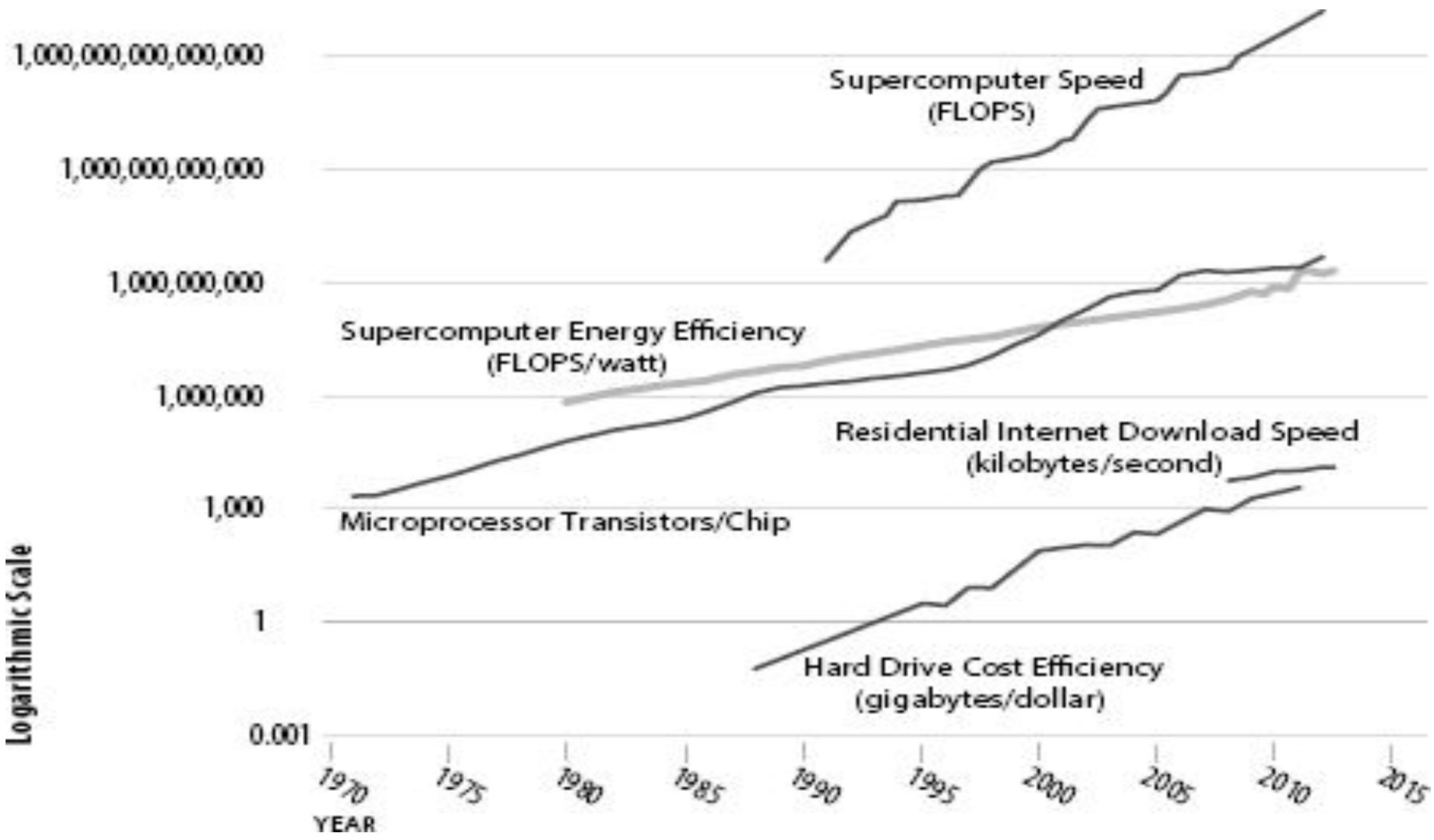
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Hard Drive Cost Efficiency
(gigabytes/dollar)
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
YEAR

50 Years of Moore's Law
1965-2015

2^{64}

$2^{32} = 4,294,967,296$

2^{32}

2^{24}

2^{16}

2^{8}

2^{1}

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We are all Khaled Said

Gaddafi said he is just like Queen Elizabeth who has been queen for 57 years (& he only ruled for 42 years). He asked Libyans to stop their kids from taking the Hallucination pills from AlQaeda! I'm so bored of this word. Can we use a new boogeyman to scare people with other than AlQaeda?

Does this AlQaeda scare mongering technique by world leaders to rule people by scaring them still works in your country? 13 hours ago

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We are all Khaled Said + Others | **Just We are all Khaled Said** | Just Others

We are all Khaled Said If you remember during our revolution days, I told you Egyptians don't & won't forget those who support them (& those who supported the dictator).

Thank you World Media. Thank you all members of this page. Thank you All for supporting our peaceful dignity revolution.

Today Friday, 25 Feb we are back in Tahrir to re-affir...

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Egyptians are expressing their gratitude to all international press and media personnel who covered the Egyptian Revolution of Jan25

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We are all Khaled Said Tahrir square. We were there.

.

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Try new things

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Seek uncommon wisdom

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