

Engineering, Ethics and Society: Building the Information Age

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Engineering 183EW, UCLA SEAS
Lecture 7

Lecture Contents

The Machine Age – 1900 to 1945

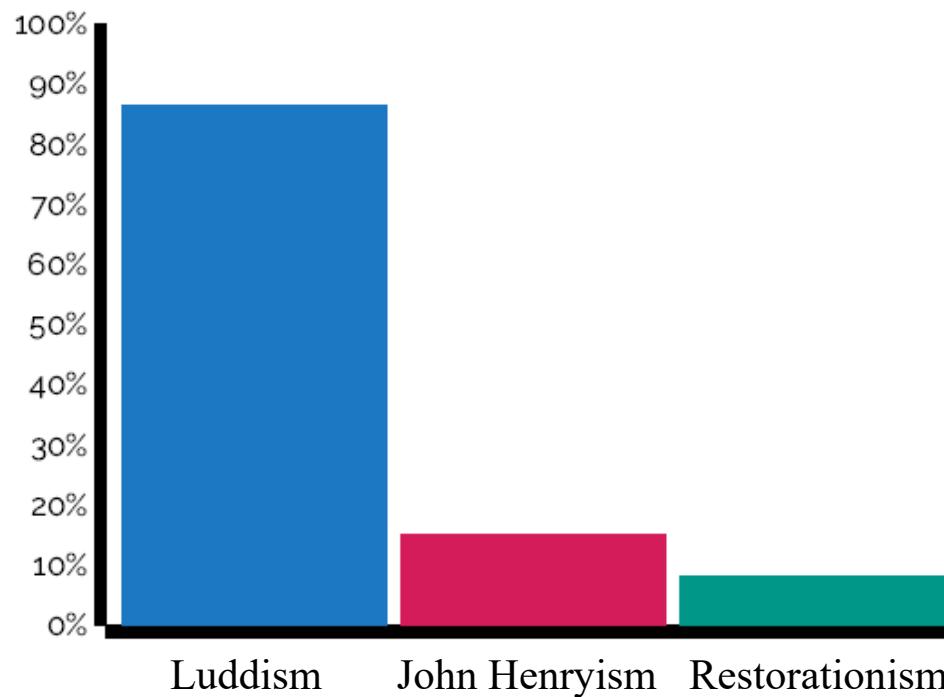
- Technology Innovation and Integration
- Mass Production and Societal Effects
- Futurism and Modernity
- Society Connects: Radio and Air Transport
- Seeing the Future: The New York World's Fair
- World War II and its Ethical Consequences

The Postwar World – 1946 to 2000

- Postwar Technologies
- Modernism Evolves
- Societal Ethics Evolve
- Technology Evolution and Societal Effects
- Post-Modernism Begins
- 20th Century Summary and the Road Ahead

Online Poll Responses

Miners' protests over loss of coal mining jobs in Pennsylvania because of automation could be called a modern case of what reaction?



Technology Timeline: The Transition Begins

1900 1910 1920 1930 1940 1950



Skyscraper

Mass Production

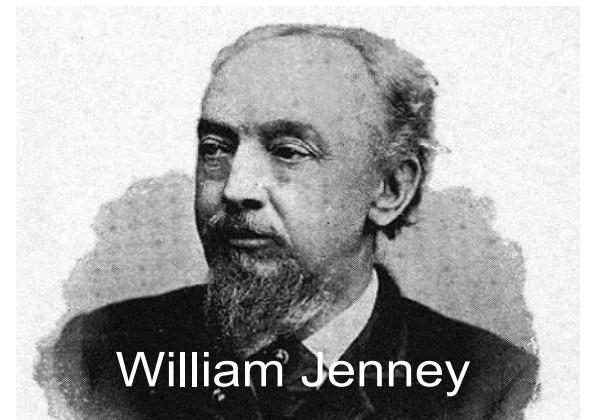
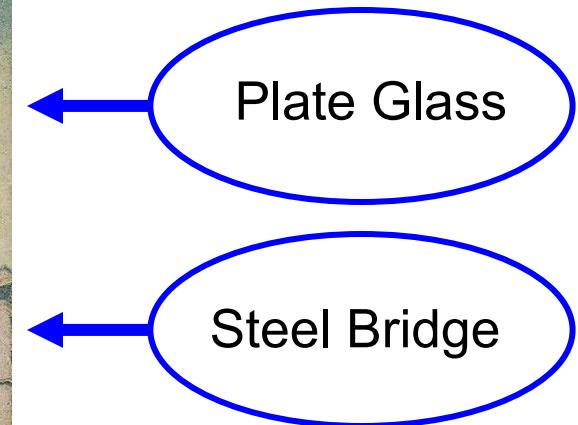
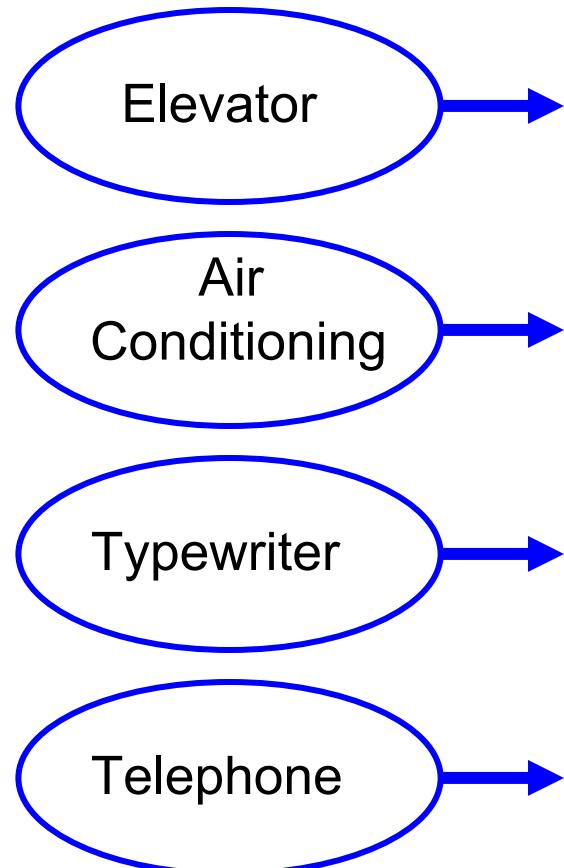
Publ

Heavier than Air Flight

Electrificatio



Skyscraper: Synthesis of New Technologies



The Private Car: Electric and Gas Coexist



1902 White-Stanhope
Gas Automobile

'07 Eureka 1
Super Jumbo
Electric



Electric Car and Charging Station

The Private Car: Gas Power Takes Over



1903 Cadillac Model A

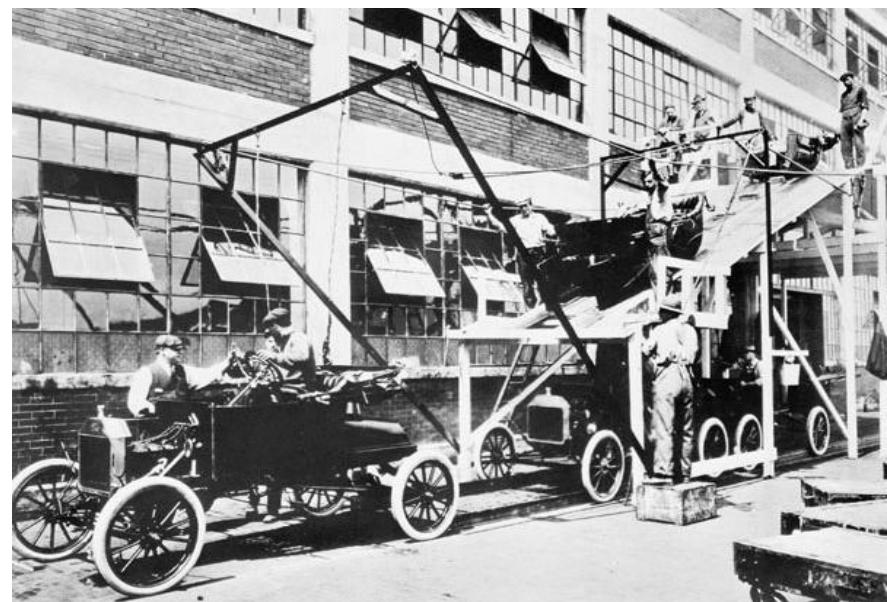
Henry Ford Brings New Mobility for the Masses

Henry Ford's Improvements:

- Standardized - Model T
- Simplified - Black Only
- Improvable – Company R&D
- Affordable -- \$750 (to \$250)

Henry Ford's Innovations:

- Moving Assembly Line
- \$5 Per Day Wage
- Building of 'Consumer Class'



Mass Production vs. Craft Production

Craft Production versus Mass Production in the Assembly Hall: 1913 versus 1914

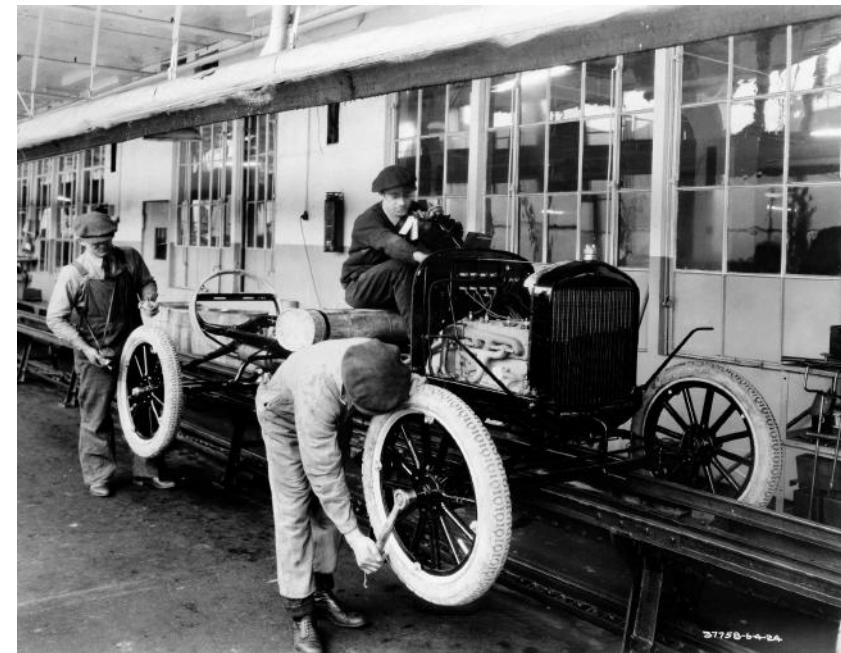
<i>Minutes of Effort to Assemble:</i>	<i>Late Craft Production, Fall 1913</i>	<i>Mass Production, Spring 1914</i>	<i>Percent Reduction in Effort</i>
Engine	594	226	62
Magneto	20	5	75
Axle	150	26.5	83
Major Components into a Complete Vehicle	750	93	88

Note: “Late craft production” already contained many of the elements of mass production, in particular consistently interchangeable parts and a minute division of labor. The big change from 1913 to 1914 was the transition from stationary to moving assembly.

Source: Calculated by the authors from data given in David A. Hounshell, *From the American System to Mass Production, 1800–1932*, Baltimore: Johns Hopkins University Press, 1984, pp. 248, 254, 255, and 256. Hounshell’s data are based on the observations of the journalists Horace Arnold and Fay Faurote as reported in their volume *Ford Methods and the Ford Shops*, New York: Engineering Magazine, 1915.

Mechanization of Human Work

- The Moving Assembly Line
 - Single-task jobs
- **Workers as machines**
 - Unskilled preferred



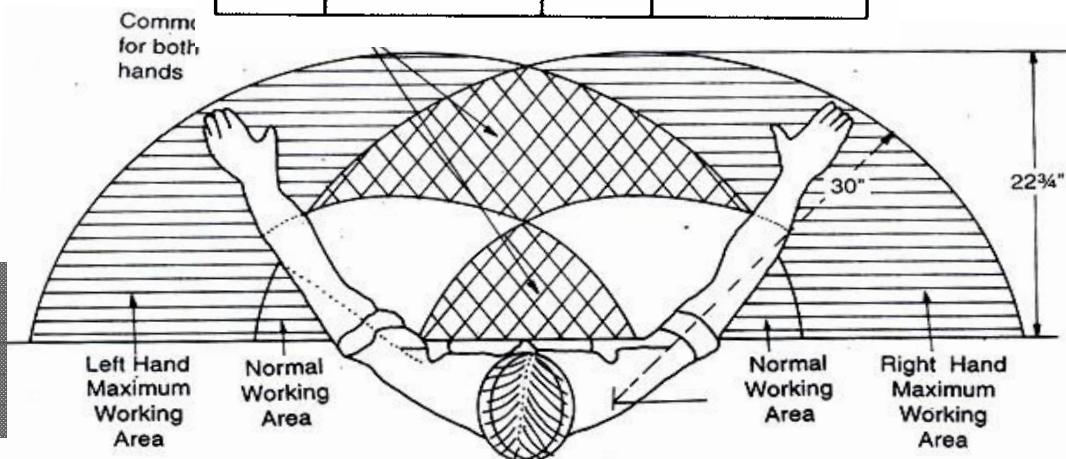
Mechanization of Human Work

- The Moving Assembly Line
 - Single-task jobs
 - Humans as machines
 - Unskilled are preferred
- ‘Time and Motion’ Engineering
- “Scientific Management”
 - Expertise moves upward
 - Compensation moves upward
 - ‘Democratic’ participation is widely touted
 - Labor contribution is actually discouraged

Commentators have recognized these changes as enhancing the “separation of thinking from doing¹”

Therbligs

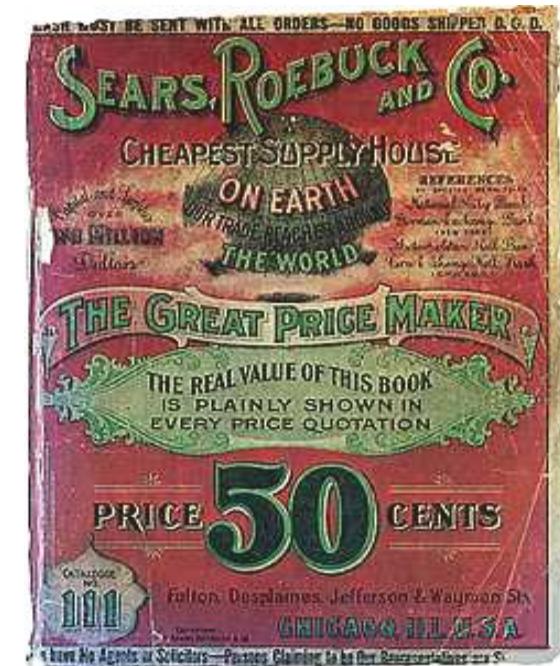
○	SEARCH	○	INSPECT
○○	FIND	○	PRE-POSITION
→	SELECT	○	RELEASE LOAD
∩	GRASP	○	TRANSPORT EMPTY
⌚	TRANSPORT LOADED	⌚	REST FOR OVER COMING FATIGUE
9	POSITION	○	UNAVOIDABLE DELAY
#	ASSEMBLE	⌚	AVOIDABLE DELAY
U	USE	⌚	PLAN
〃	DISASSEMBLE		



¹Matthew Crawford, “Shop Class as Soulcraft,” Penguin Books: New York, 2009

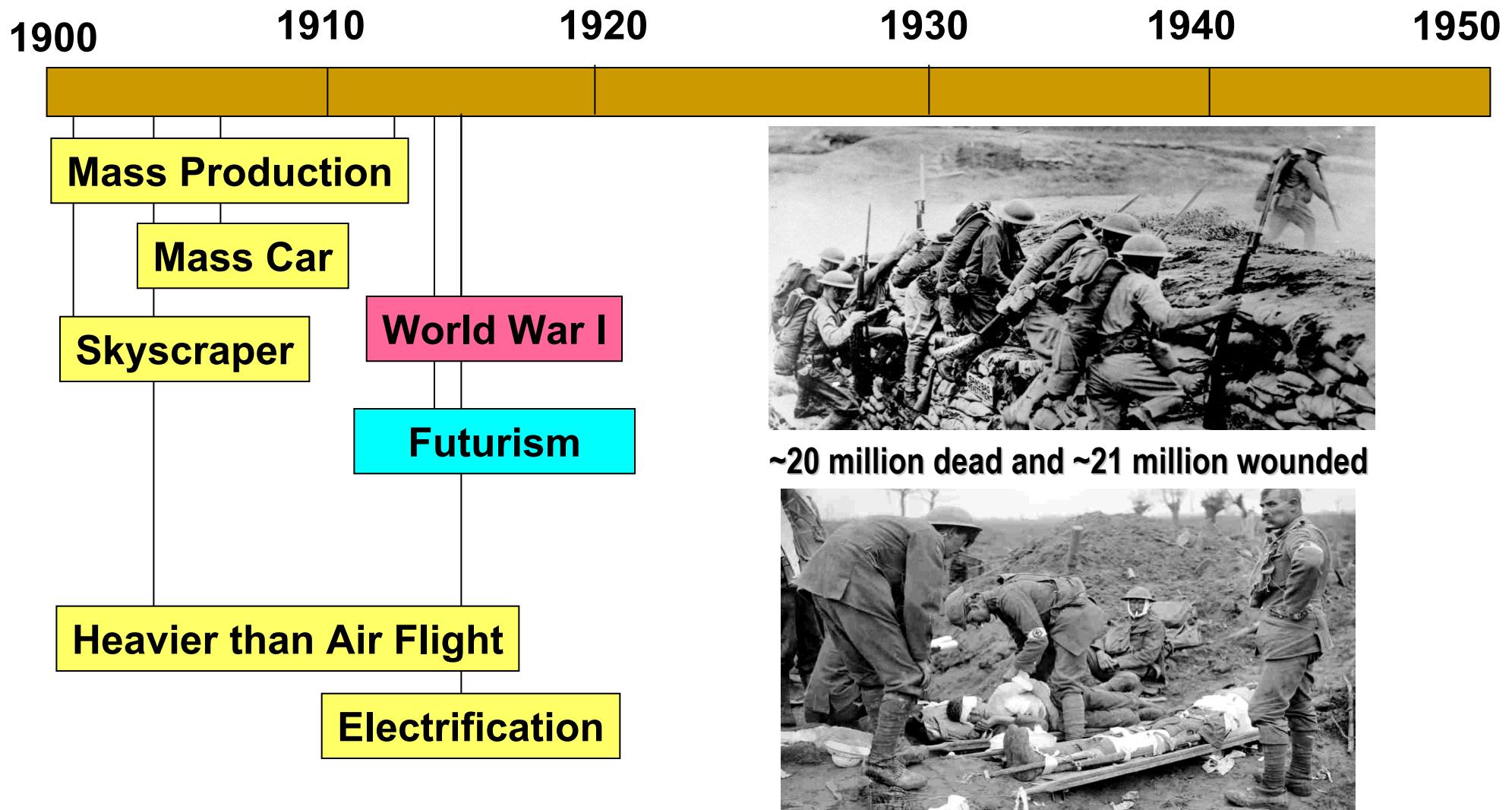
Effects of Mass Production

- Increased Flow of Consumer Goods
 - Affordable quality
 - All levels of society
- New Distribution and Marketing Channels
 - Department stores and mail order catalogs
 - Food “super” markets
 - National as well as local advertising
- Restructuring of Social Strata
 - A steady factory paycheck
 - Growth of a “middle class”
 - Individual vs. family and community
 - New societal divisions
 - Labor and Capital
 - Blue Collar and. White Collar
 - Large and powerful industrial and craft unions
 - Local political party “machines”



The frugal American character is rewired for “aspirational consumerism.”
Instead of rioting over change, American workers organize to benefit.

Technology Timeline: World War I Interrupts



Futurism: A Philosophy of the “Modern” World

Futurism appreciated the radical nature of technological change, and predicted that the newly introduced technologies would contribute to *Modernizing* all aspects of society – which would *only be for the better!*

The Futurist Manifesto (1909–1935)

- We intend to sing the love of danger, the habit of energy and fearlessness.
- We affirm that the world's magnificence has been enriched by a new beauty: the beauty of speed. A racing car whose hood is adorned with great pipes, like serpents of explosive breath—a roaring car that seems to ride on grapeshot is more beautiful than the Victory of Samothrace.
- We want to hymn the man at the wheel, who hurls the lance of his spirit across the Earth, along the circle of its orbit.
- We will sing of great crowds excited by work, by pleasure, and by riot; we will sing of the multicolored, polyphonic tides of revolution in the modern capitals; we will sing of the vibrant nightly fervor of arsenals and shipyards blazing with violent electric moons; greedy railway stations that devour smoke-plumed serpents; factories hung on clouds by the crooked lines of their smoke; bridges that stride the rivers like giant gymnasts, flashing in the sun with a glitter of knives; adventurous steamers that sniff the horizon; deep-chested locomotives whose wheels paw the tracks like the hooves of enormous steel horses bridled by tubing; and the sleek flight of planes whose propellers chatter in the wind like banners and seem to cheer like an enthusiastic crowd

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crowd



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Umberto Boccioni, Unique Forms of
Continuity in Space; 1913

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- **We will glorify war—the world's only hygiene—militarism, patriotism, the destructive gesture of freedom-bringers, beautiful ideas worth dying for.**

Modernism: Design Stages

1890-
1920



1920-
1939

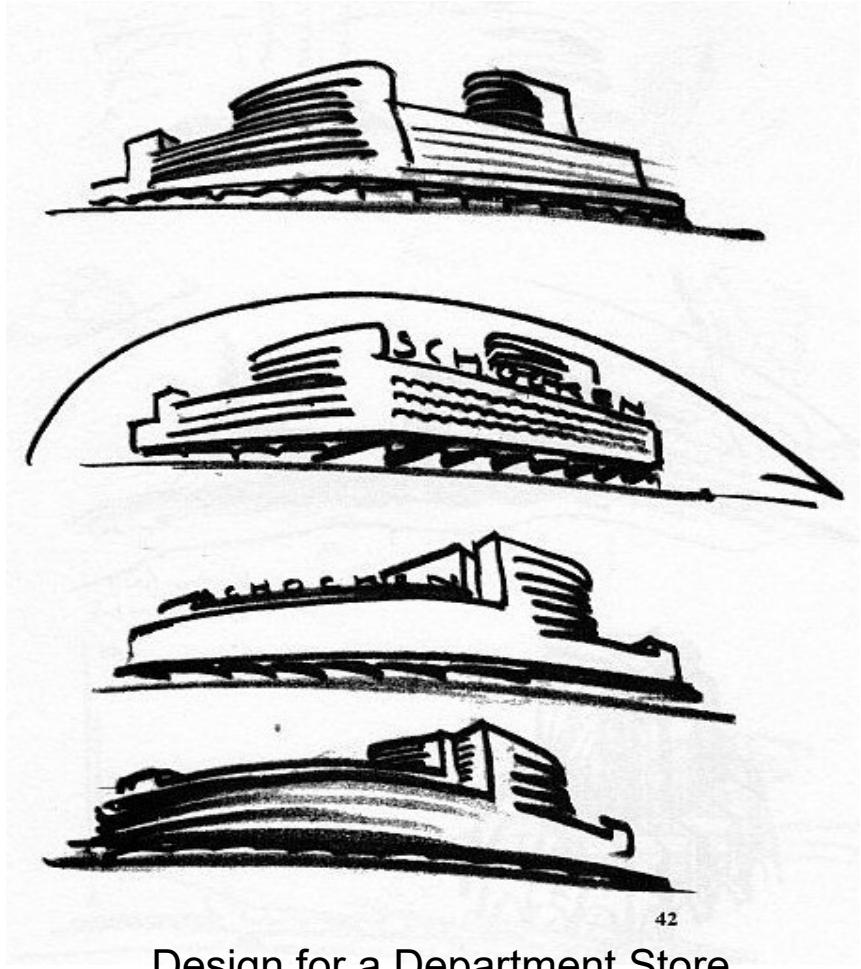


1930-
1950



Machine Age

Modernism: New Ways of Building

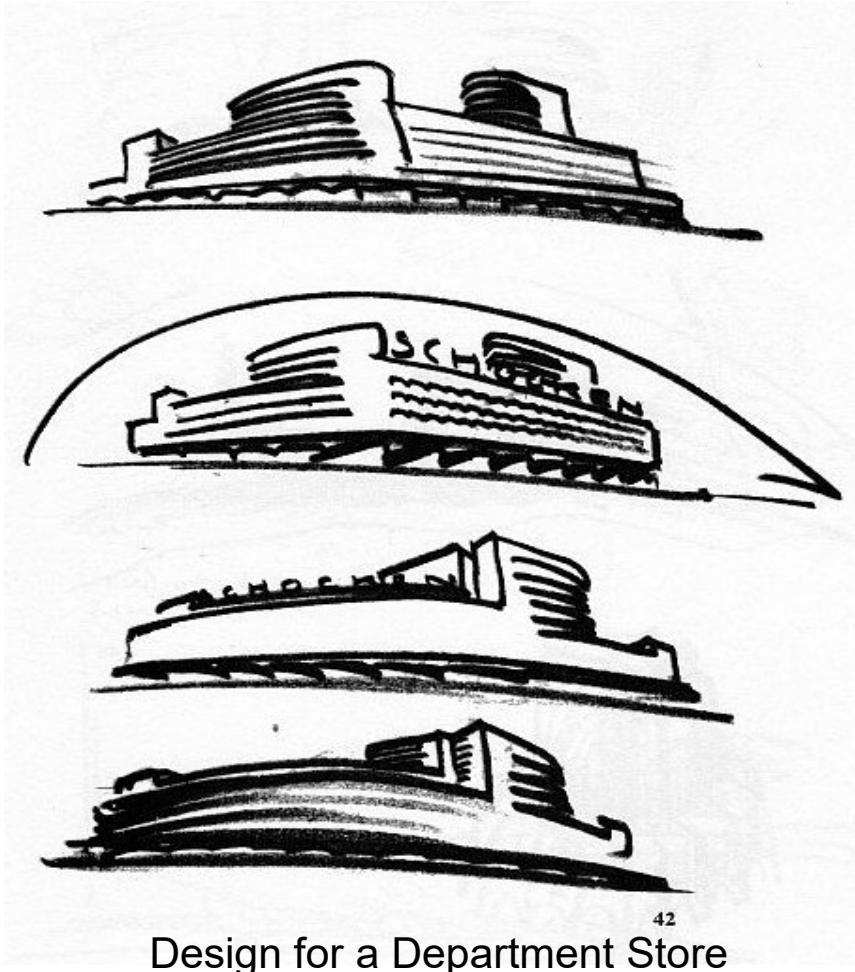


Design for a Department Store
Architect: Eric Mendelsohn

Einstein Tower, Potsdam
Eric Mendelsohn, 1921



Modernism: New Ways of Building



Design for a Department Store
Eric Mendelsohn, ~1920



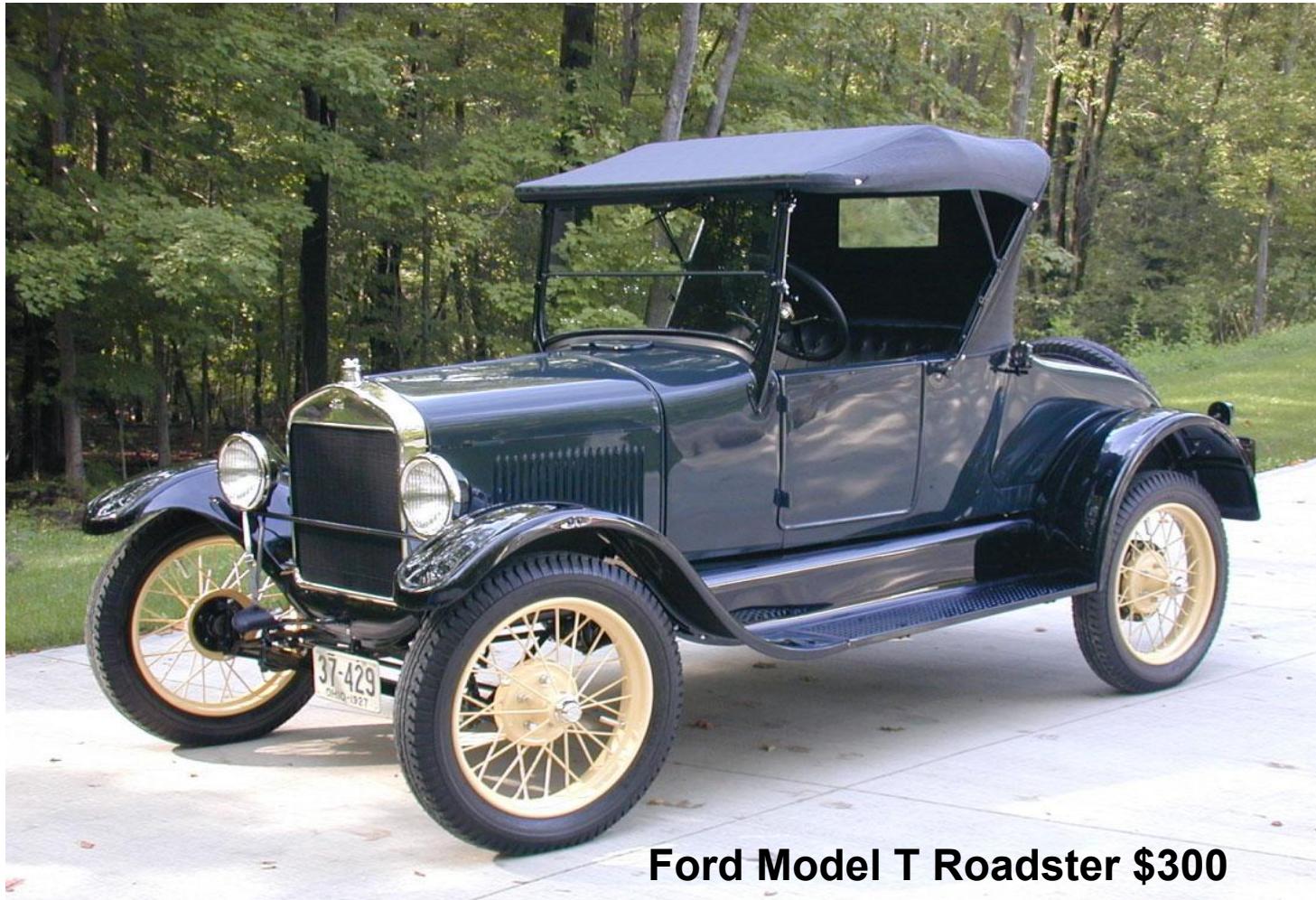
Shoenen Department Store,
Chemnitz, Eric Mendelsohn, 1928

Mendelsohn's Influence Today



Co-Bogen Mall,
Dusseldorf, Germany; Daniel Libeskind, 2015

Modernism: Economy vs. Style (~1927)



Modernism: Style vs. Economy (~1927)



LaSalle Roadster \$2100

Modernism: Style vs. Economy (~1930s)



Delahaye Roadster \$\$\$\$

Modernism: A Streamlined World

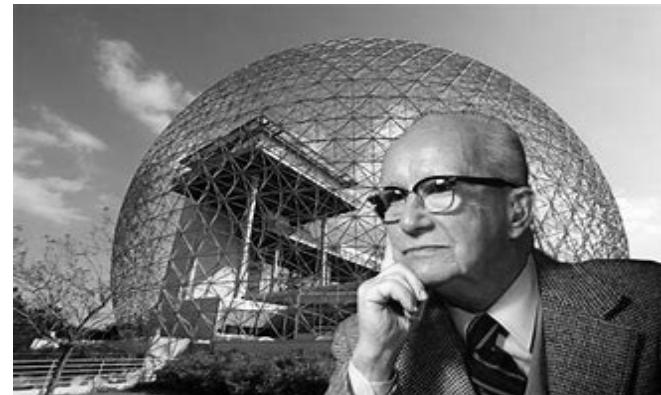


Dymaxion* House



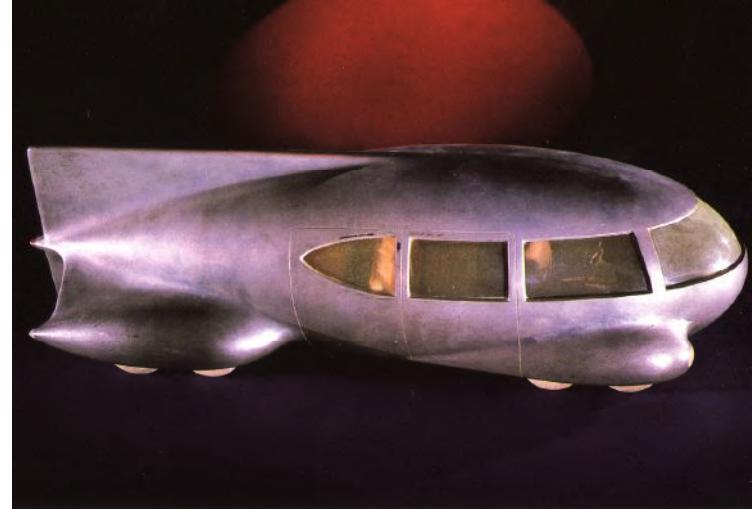
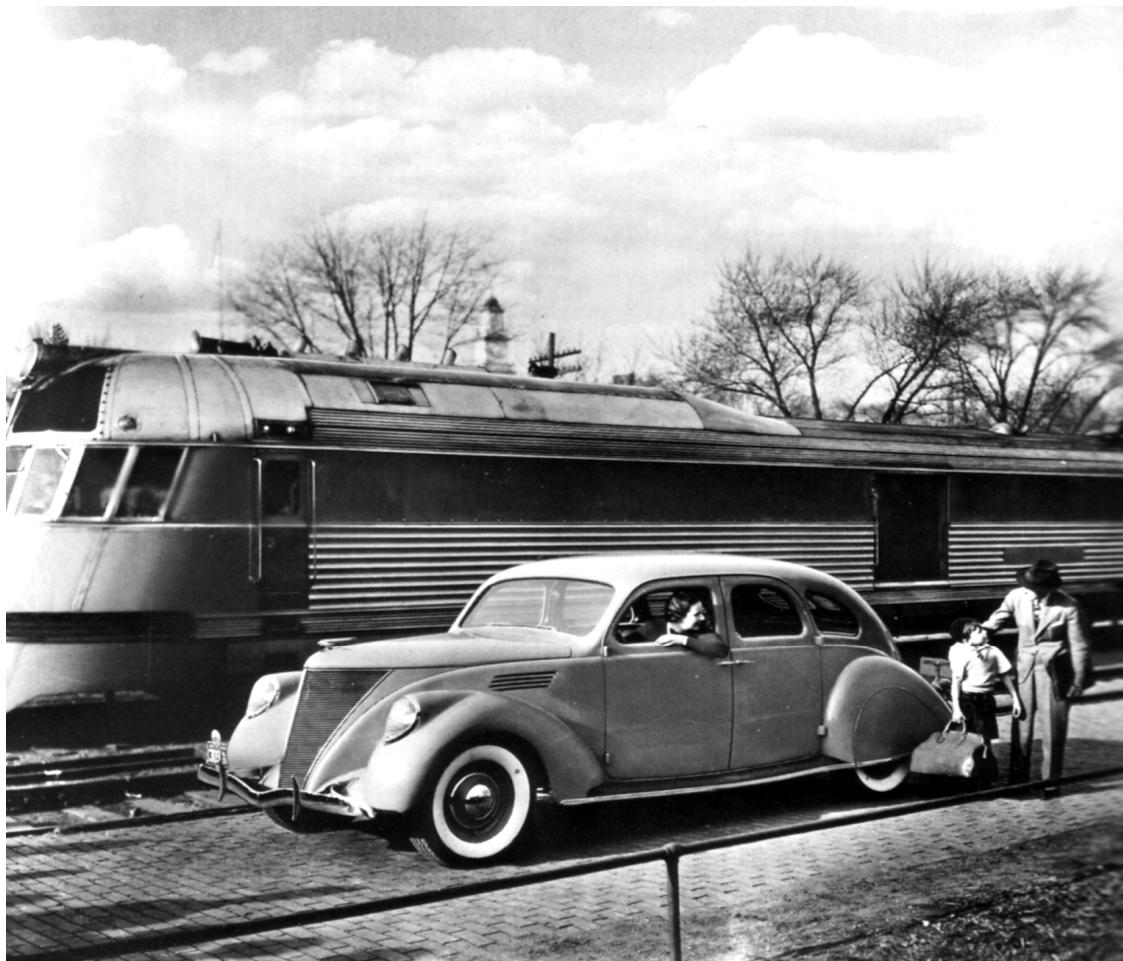
Dymaxion* Car

Buckminster Fuller
Designer and Visionary



*Dymaxion = dynamic + maximum + tension

Modernism: Streamlined Transport

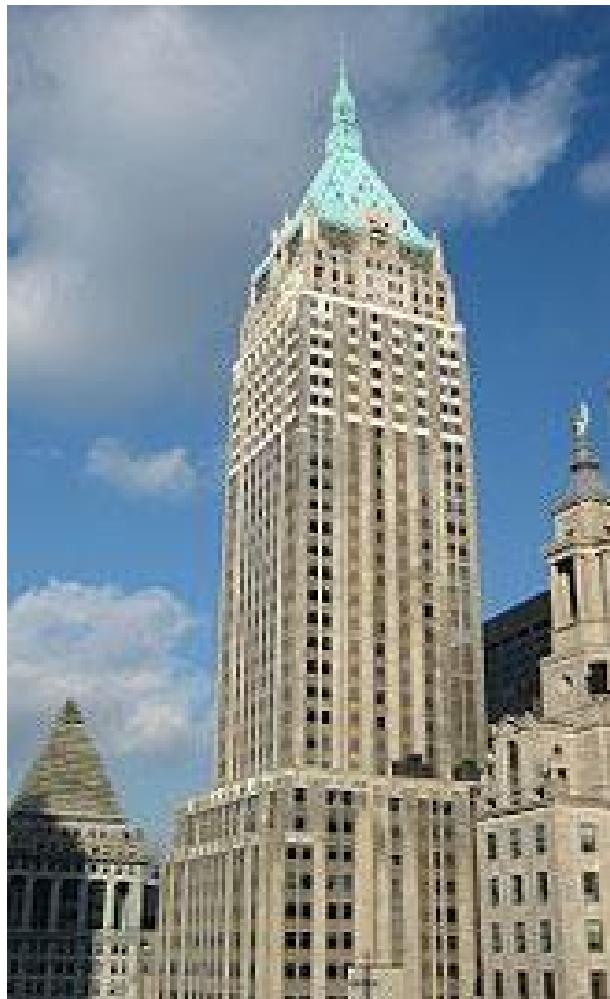


Above, Ford Zephyr, 1934; top right, Cord Sedan, 1936;
bottom right, Norman Bel Geddes concept car, 1933

Modernism: Streamlined Consumer Products



Modernism: Real Skyscrapers of New York City....



40 Wall Street 1928



Empire State Building 1931

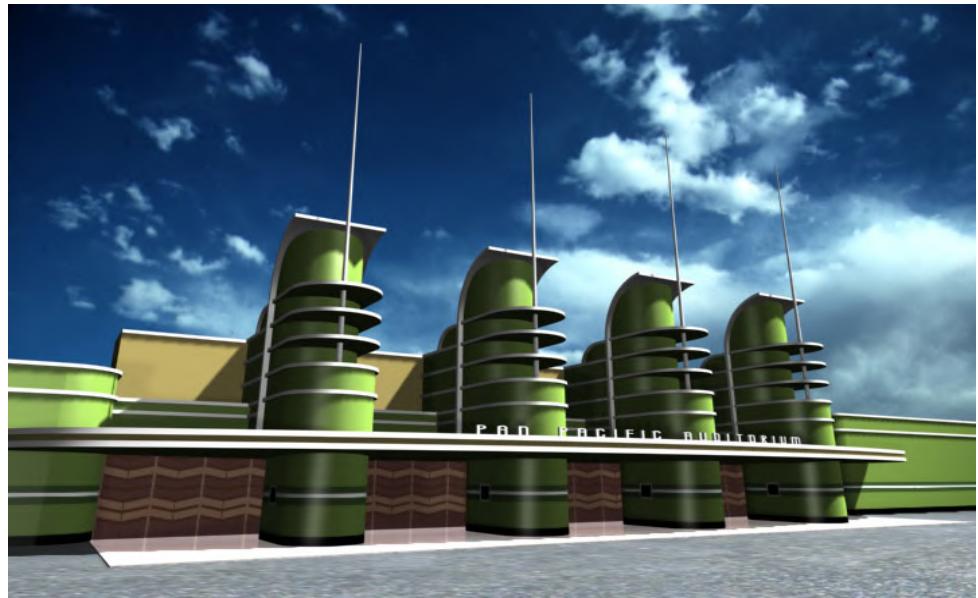


Chrysler Building 1930

...and Some Distinctive Los Angeles Buildings



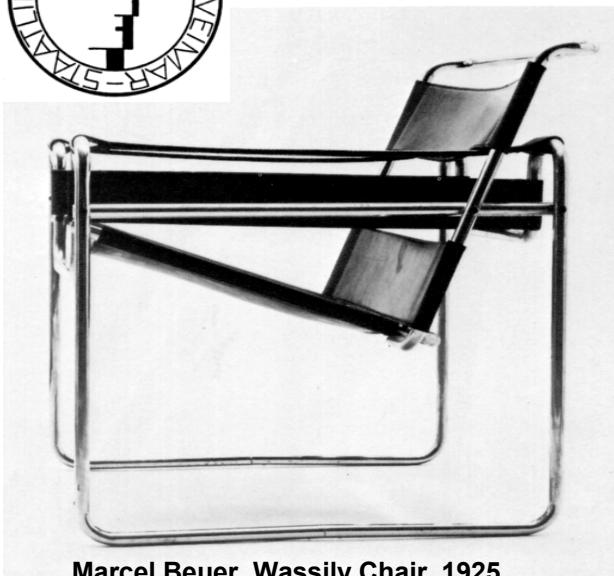
Bullocks' Wilshire, 1929



Pan Pacific Auditorium, 1932



Bauhaus Design: “Form Follows Function”



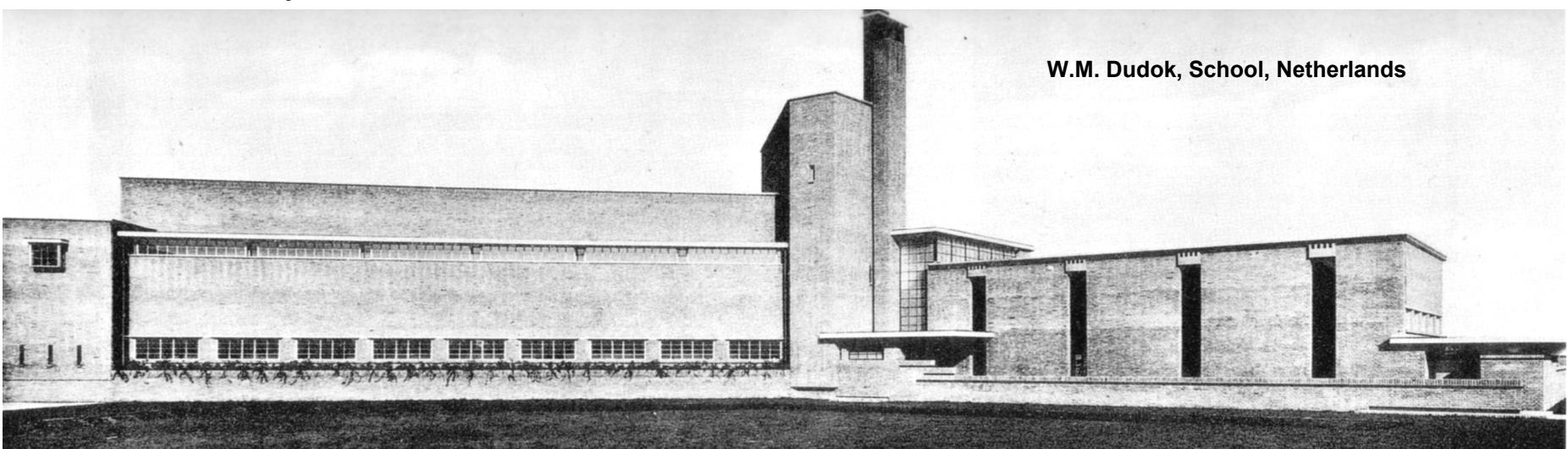
Marcel Breuer, Wassily Chair, 1925



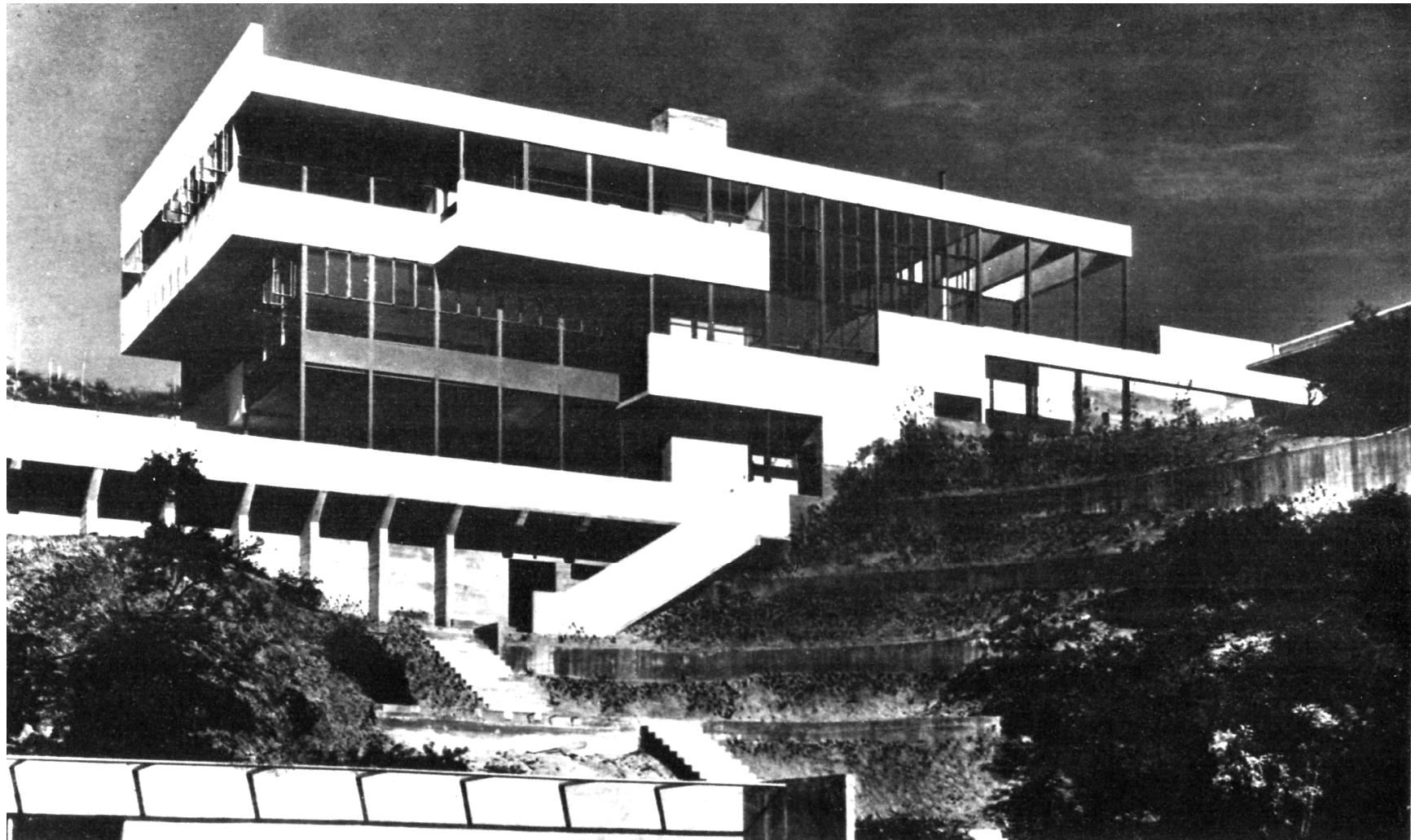
Marcel Breuer, Cesca Chair, 1928



Mies van der Rohe , Barcelona Chair, 1929



Bauhaus Style Home: “A Machine for Living”



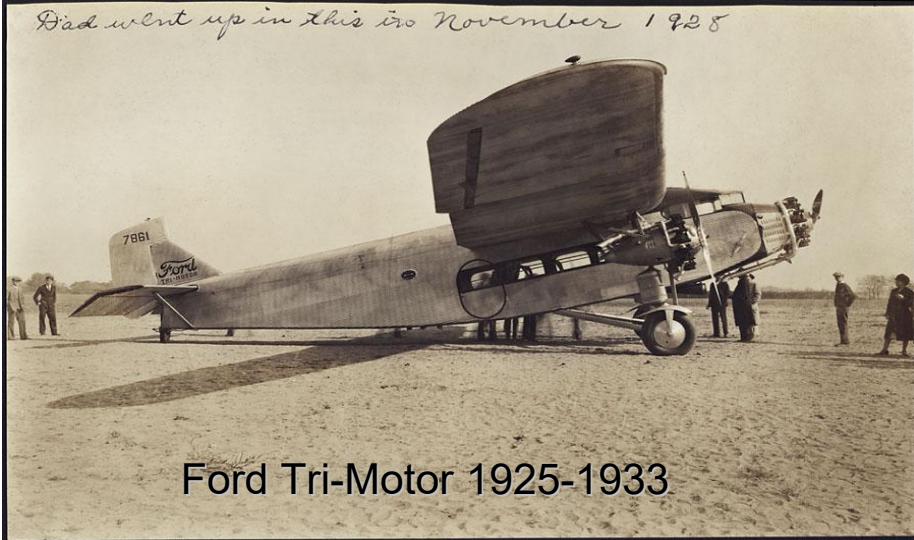
Lovell “Health” House, Richard Neutra, Los Angeles, 1929

Society Connects: Radio

- First commercial broadcast in 1920
- 600 stations by 1922
- 70% of households by 1935
- Broad variety of drama, sports, news
and opinion
- Advertising soon follows



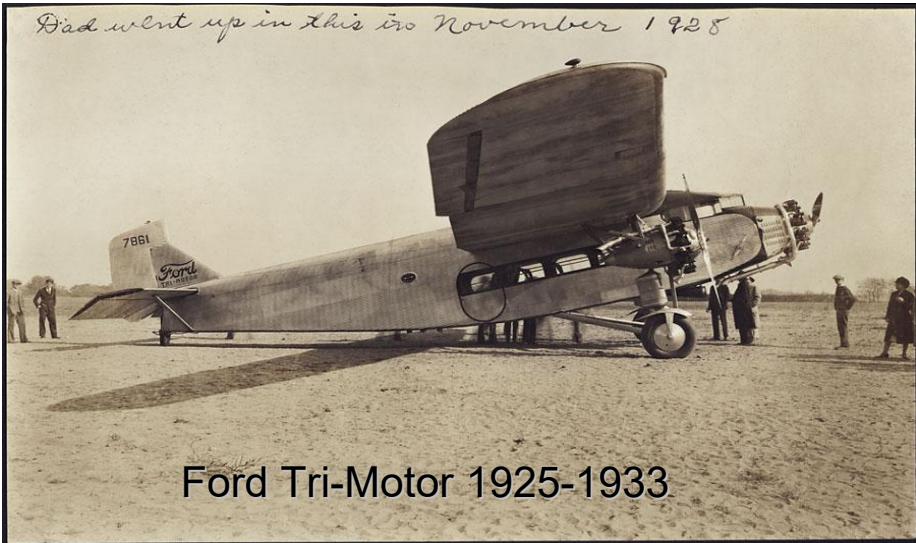
Society Connects: Air Transport



- Commercial air travel advances quickly after Wright brothers flights
- Air travel initially reserved for elite passengers
- Airplanes and Airships coexist...



Society Connects: Air Transport



- Commercial air travel advances quickly after Wright brothers flights
- Air travel initially reserved for elite passengers
- Airplanes and Airships coexist... until the 1937 Hindenburg disaster'



Zepplin Airship 1910-1937

Society Connects: Air Transport

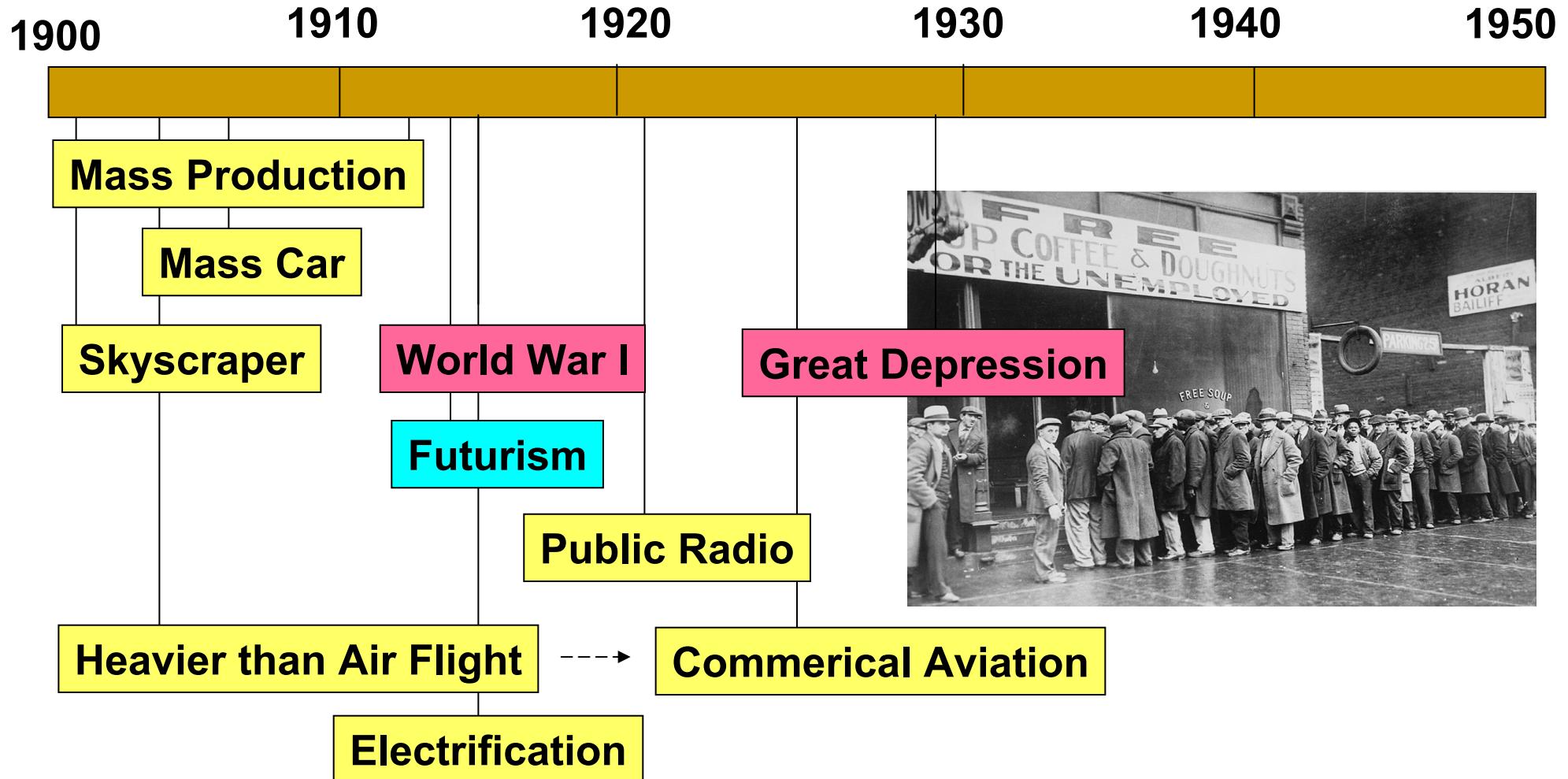


Eastern Airline's Great Silver Fleet DC-3 NC28391, c/n 2268.
Photo via C. Grady Cates

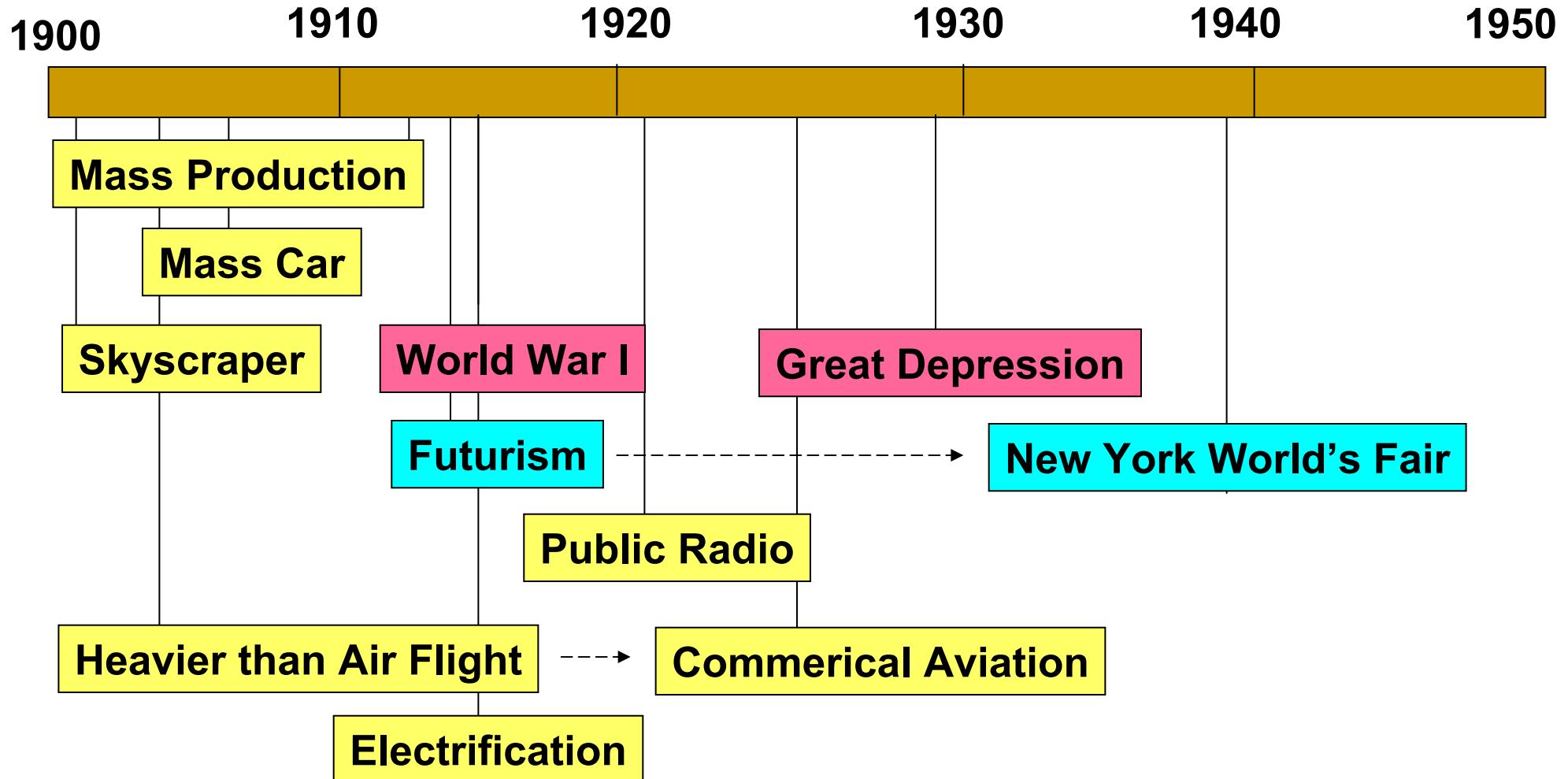
- Commercial air travel advances quickly after Wright brothers flights
- Air travel initially reserved for elite passengers
- Airplanes and Airships coexist until 1937 Hindenburg disaster'
- Douglas DC-3 revolutionizes the industry in the 1930s and 1940s by opening air travel to a larger customer base

Zeppelin Airship 1910-1937

Technology Timeline



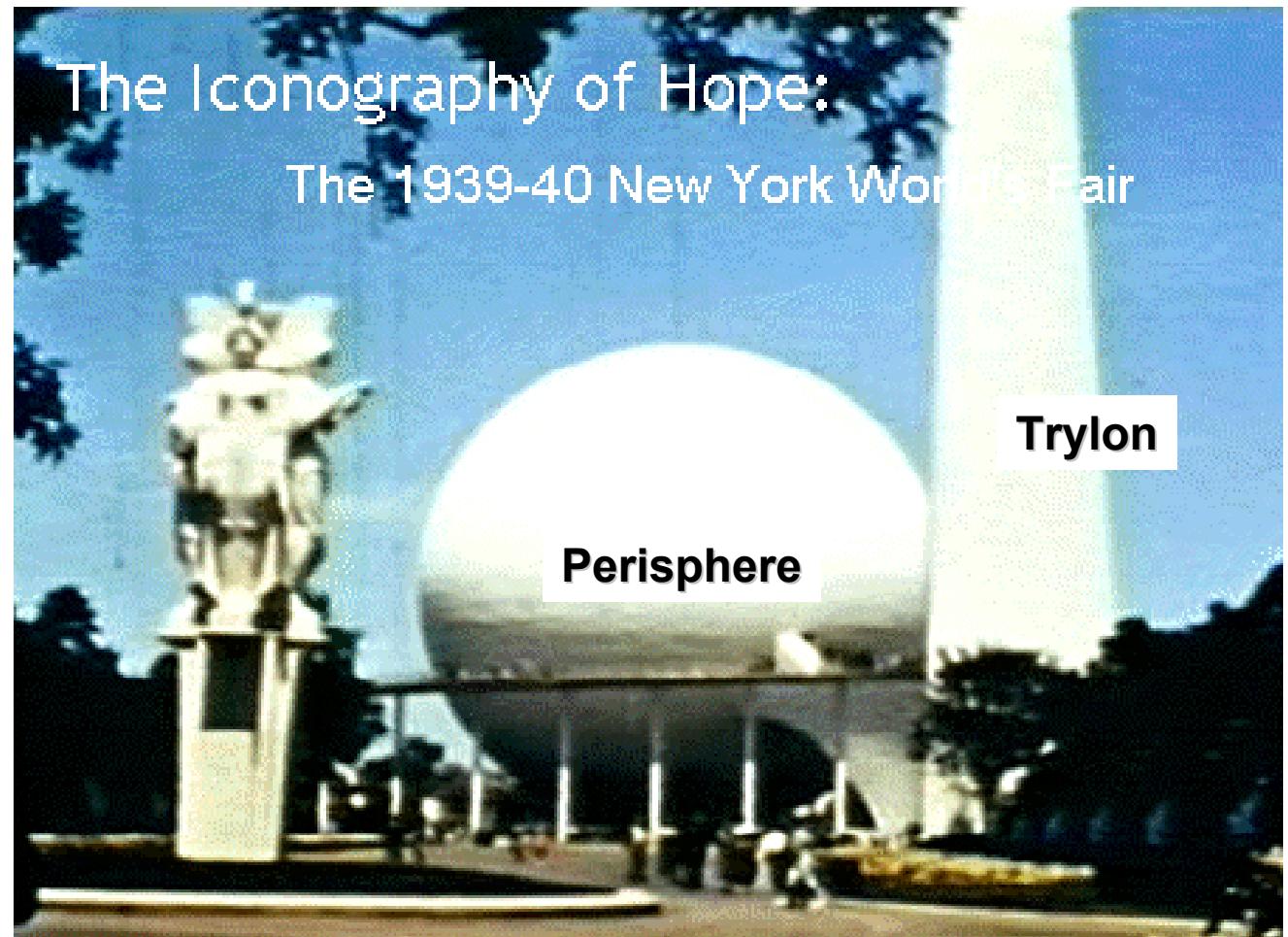
Technology Timeline



1939 New York World's Fair: Peak of Futurism

World Expositions

- London 1851
- New York 1853
- Paris 1855
- Philadelphia 1876
- Paris 1889
- Chicago 1893
- Chicago 1933
- Brussels 1935
- San Diego 1935
- Dallas 1936
- Cleveland 1937
- Paris 1937
- San Francisco 1939



Layout of the Fair



Democracy: Urban Center of the Future Panorama



TV Communications



1960 Cityscape: GM's Futurama



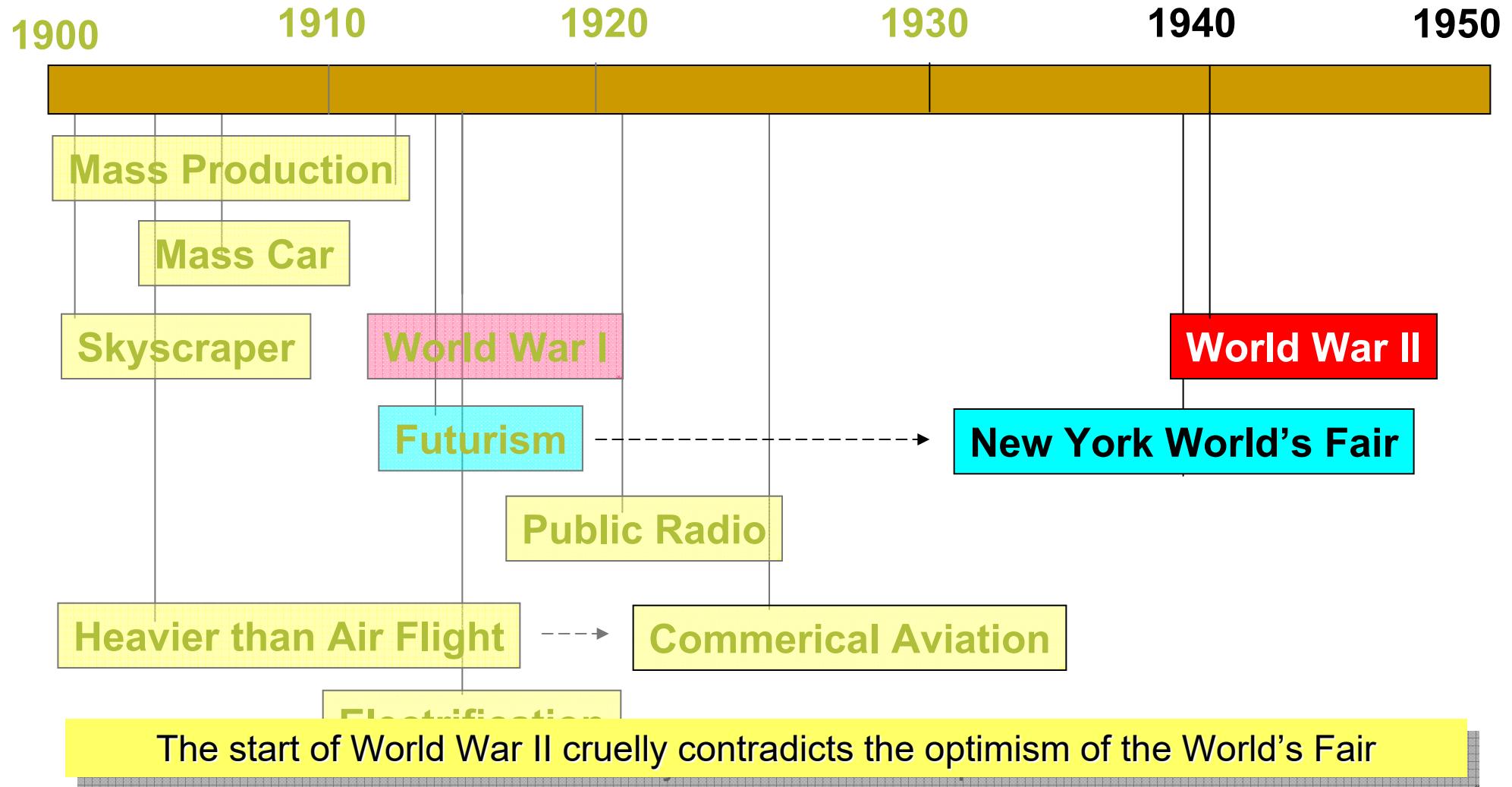
Seeing “The World of Tomorrow”

I think that there are moments where you can see the world turning from what it is into what it will be. For me, the New York World's Fair is such a moment. It is a compass rose pointing in all directions, toward imaginary future and real past, false future and immutable present, a world of tomorrow contained in the lost American yesterday.“

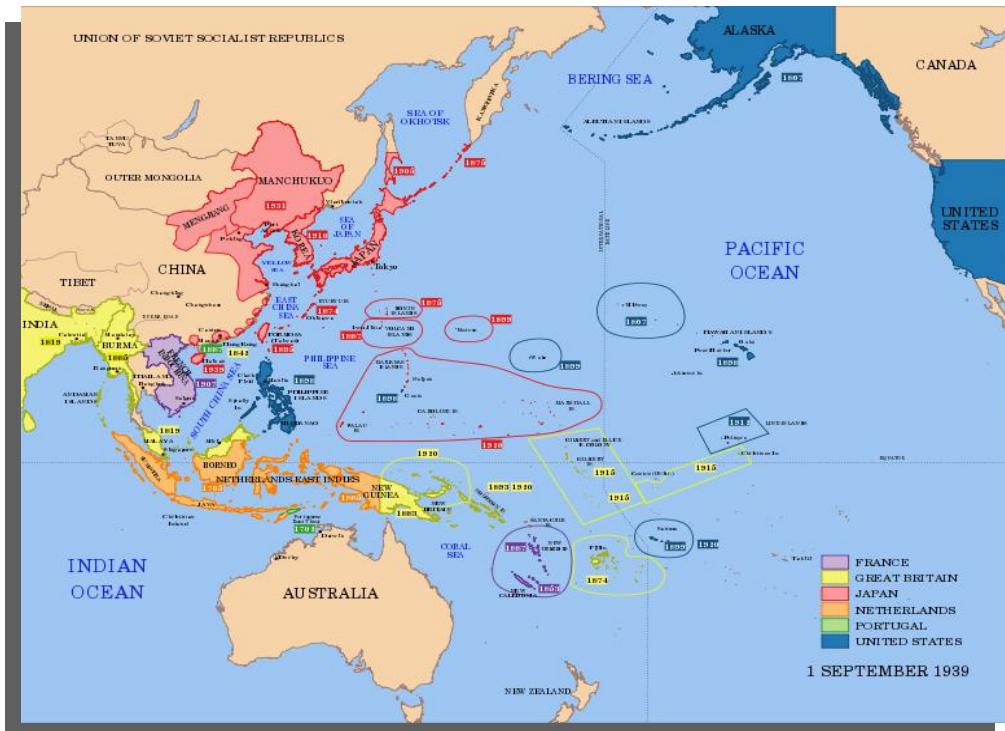
- John Crowley, from the film *The World of Tomorrow*

The 1939 New York World's Fair has been called the “peak of Futurism” because World War II, which started while the Fair was still on, served to limit our enthusiasm for the effects of technology on society.

Technology Timeline



WWII is a Two-Theater World War....

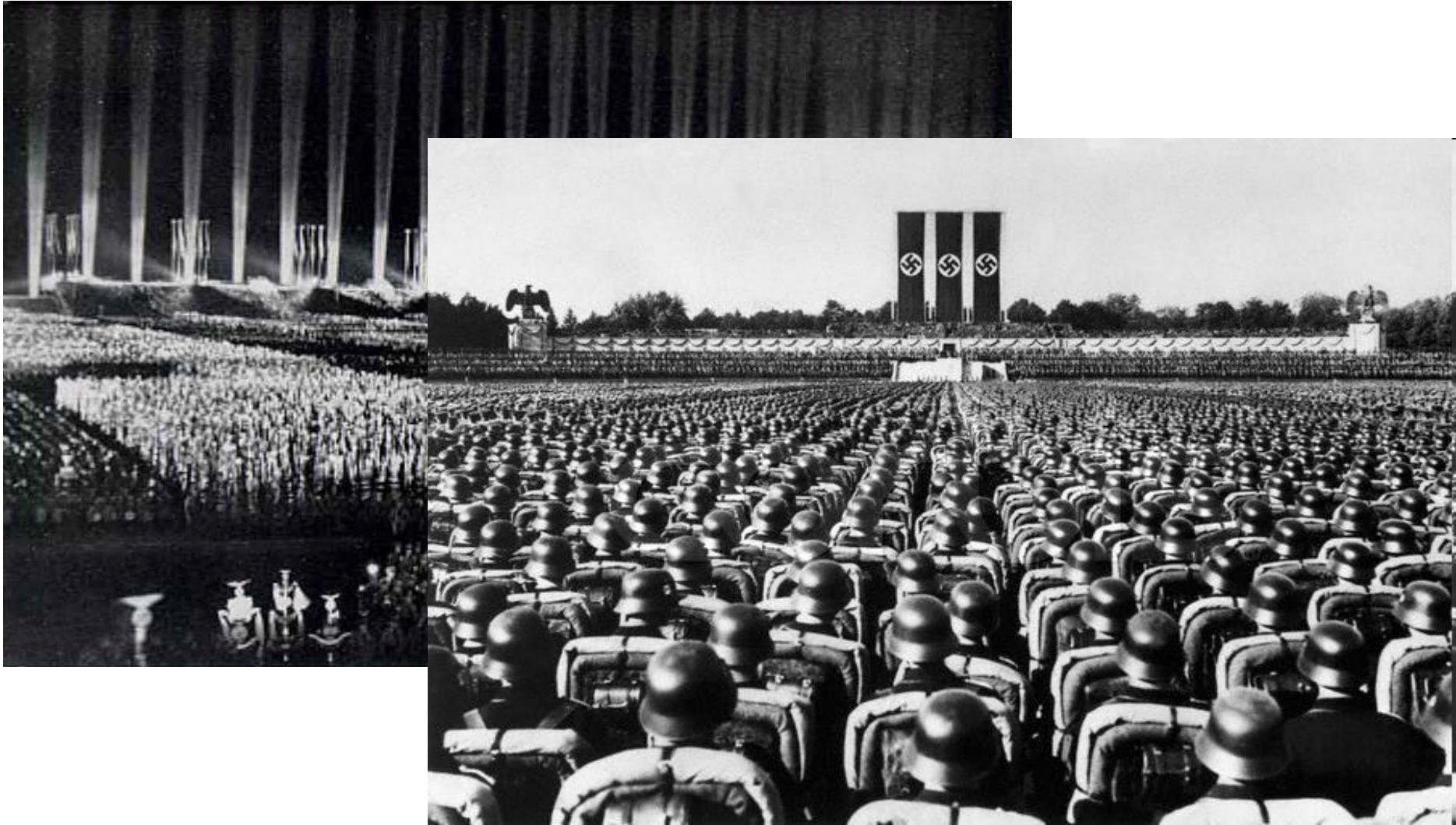


The Pacific Theater



The European Theater

....Fought Against Societies Prepared for War....



.... by America's "Average Joes"....



*"Joe, yestiddy ya saved my life an' I swore I'd pay ya back.
Here's my last pair of dry socks."*

....and America's Mass Production Capabilities

- Adaptation of car assembly methods
- 250 million sq. feet
- >5 million workforce
- 50,000 aircraft/year
- 21,000 tanks/year



B-25 Bomber Production Line

Rosie the Riveter, J. Howard Miller and G.E.

Military Technology of World War II

Evolutionary

- Small Arms: Rifle, machine gun, bazooka (RPG)
- Armor and Transport: Battle tank, long range artillery, jeep
- Aircraft: Heavy bomber, fighter, close air support, jet engine
- Ships: Submarine, aircraft carrier, battleship, destroyer
- Genocide: Concentration and extermination camps

Revolutionary

- Electronics: Radar, bomb sights
- Computation: Cryptography
- Weapons of Mass Destruction:
 - Saturation and incendiary bombing
 - Ballistic and semi-guided missiles
 - The Atomic Bomb

The Atomic Bomb



Hiroshima Bomb

- Atomic Scientists Letter (1939)
- Manhattan Project (1942)
 - Scientists & engineers
 - Los Alamos, New Mexico
- Two Bombs
 - Hiroshima (Aug 6, 1945)
 - Nagasaki (Aug 9, 1945)
- One Stated Purpose
 - Produce “Shock and Awe”
 - Force Japanese surrender
- The Result
 - Japan surrenders
 - Ethical controversy ignites



Hiroshima Explosion

Ethical Analysis: Conventional

Ethical Theory: Utilitarianism/Consequentialism



150,000 Japanese killed immediately

Vs.



1,500,000 total killed in fight for Japanese homeland

President Truman's Position

THE WHITE HOUSE

Washington, D.C.

IMMEDIATE RELEASE —August 6, 1945

STATEMENT BY THE PRESIDENT OF THE
UNITED STATES

"It was to spare the Japanese people from utter destruction that the ultimatum of July 26 was issued at Potsdam. Their leaders promptly rejected that ultimatum. **If they do not now accept our terms they may expect a rain of ruin from the air, the like of which has never been seen on this earth.** Behind this air attack will follow sea and land forces in such numbers and power as they have not yet seen and with the fighting skill of which they are already well aware."



Ethical Analysis: Reevaluated

Ethical Theory: Duty



150,000 Japanese killed immediately

Vs.



No more American deaths

I believe President Truman saw it as his duty to end the war immediately, once he had the ability to do so without causing any more American deaths.

Ethical Analysis: Reevaluated

Ethical Theory: Pragmatism

Ethical Rationale:



150,000 killed immediately

Vs.



Refusal to order *any* more American deaths

In any case, the result was in line with utilitarian cautions:

- Inequitable distribution of “happiness”
- Unforeseen consequences: The Cold War, MAD

10 Years Later



“I am become Death, destroyer of Worlds”

Oppenheimer said that thought of this Hindu legend after seeing the first bomb test.

75 Years Later

Los Angeles Times WEDNESDAY, AUGUST 5, 2020 **A11**

OP-ED

We didn't need to start the nuclear age

U.S. leaders knew we didn't have to drop atomic bombs on Japan to win the war. We did it anyway.

By Gar Alperovitz and Martin J. Sherwin

AT A TIME WHEN Americans are reassessing so many painful aspects of our nation's past, it is an opportune moment to have an honest national conversation about our use of nuclear weapons on Japanese cities in August 1945. The fateful decision to inaugurate the nuclear age fundamentally changed the course of modern history, and it continues to threaten our survival. As the Bulletin of the Atomic Scientists' Doomsday Clock warns us, the world is now closer to nuclear annihilation than at any time since 1947.

The accepted wisdom in the United States for the last 75 years has been that dropping the bombs on Hiroshima on Aug. 6, 1945, and on Nagasaki three days later was the only way to end World War II without an invasion that would have cost hundreds of thousands of American and perhaps millions of Japanese lives.

leaders, who privately acknowledged the need to surrender promptly.

Allied intelligence had been reporting for months that Soviet entry would force the Japanese to capitulate. As early as April 11, 1945, the Joint Chiefs of Staff's Joint Intelligence Staff had predicted: "If at any time the USSR should enter the war, all Japanese will realize that absolute defeat is inevitable."

Truman knew that the Japanese were searching for a way to end the war; he had referred to Togo's intercepted July 12 cable as the "telegram from the Jap emperor asking for peace."

Truman also knew that the Soviet invasion would knock Japan out of the war. At the summit in Potsdam, Germany, on July 17, following Stalin's assurance that the Soviets were coming in on schedule, Truman wrote in his diary, "He'll be in the Jap War on August 15.

We've been taught that the U.S. had to drop atomic bombs on Japan to end World War II. History proves otherwise.

atomic bomb exhibit: "The vast destruction wreaked by the bombings of Hiroshima and Nagasaki and the loss of 135,000 people made little impact on the Japanese military. However, the Soviet invasion of Manchuria ... changed their minds." But online the wording has been modified to put the atomic bombings in a more positive light — once again showing how myths can overwhelm historical evidence.

Seven of the United States' eight five-star Army and Navy officers in 1945 agreed with the Navy's vitriolic assessment. Generals Dwight Eisenhower, Douglas MacArthur and Henry "Hap" Arnold and Admirals William Leahy, Chester Nimitz, Ernest King and William Halsey are on record stating that the atomic bombs were either militarily unnecessary, morally reprehensible, or both.

No one was more impassioned in his condemnation than Leahy, Truman's chief of staff. He wrote in his memoir "that the use of this barbarous weapon at Hiroshima and Nagasaki was of no material assistance in our war against Japan. The Japanese were already defeated and ready to surrender.... In being the first to use it we had adopted an ethical standard common to the barbarians of the Dark Ages."

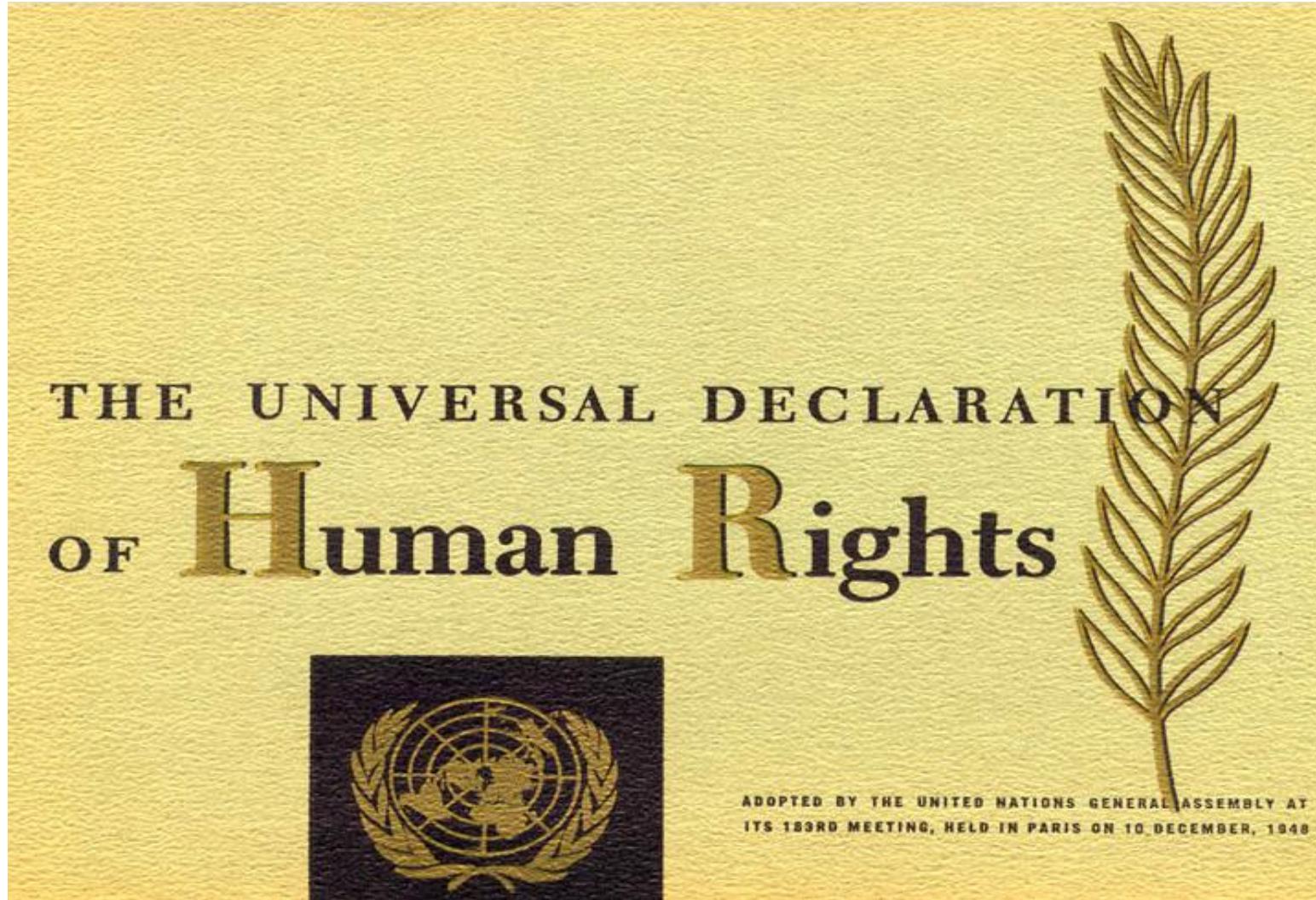
MacArthur thought the use of atomic bombs was inexcusable. He later wrote to former President Hoover that if Truman had followed Hoover's "wise and statesmanlike" ad-

A continuing debate: Right or wrong? Humane? Necessary? Unnecessary?

Lessons of World War II

- Technology can be used to support dictators, totalitarianism and purposes of pure evil
- Science-based weapons and their production are the key factors in modern warfare
- New capabilities for planet-wide destruction
- Worldwide cooperation is necessary
 - United Nations formed in 1948
 - UN introduces the Universal Declaration of Human Rights

Lessons of World War II



Lessons of World War II

Article 1 Right to Equality

Article 2 Freedom from Discrimination

Article 3 Right to Life, Liberty, Personal Security

Article 4 Freedom from Slavery

Article 5 Freedom from Torture and Degrading Treatment

Article 6 Right to Recognition as a Person before the Law

Article 1

All human beings are born **free and equal in dignity and rights**. They are **endowed** with reason and conscience and should act towards one another in a spirit of **brotherhood**.

~~Article 11 Right to be Considered Innocent until Proven Guilty~~

Article 12 Freedom from Interference with Privacy

Article 13 Right to Free Movement in and out of the Country

Article 14 Right to Asylum in other Countries from Persecution

Article 15 Right to a Nationality and the Freedom to Change It

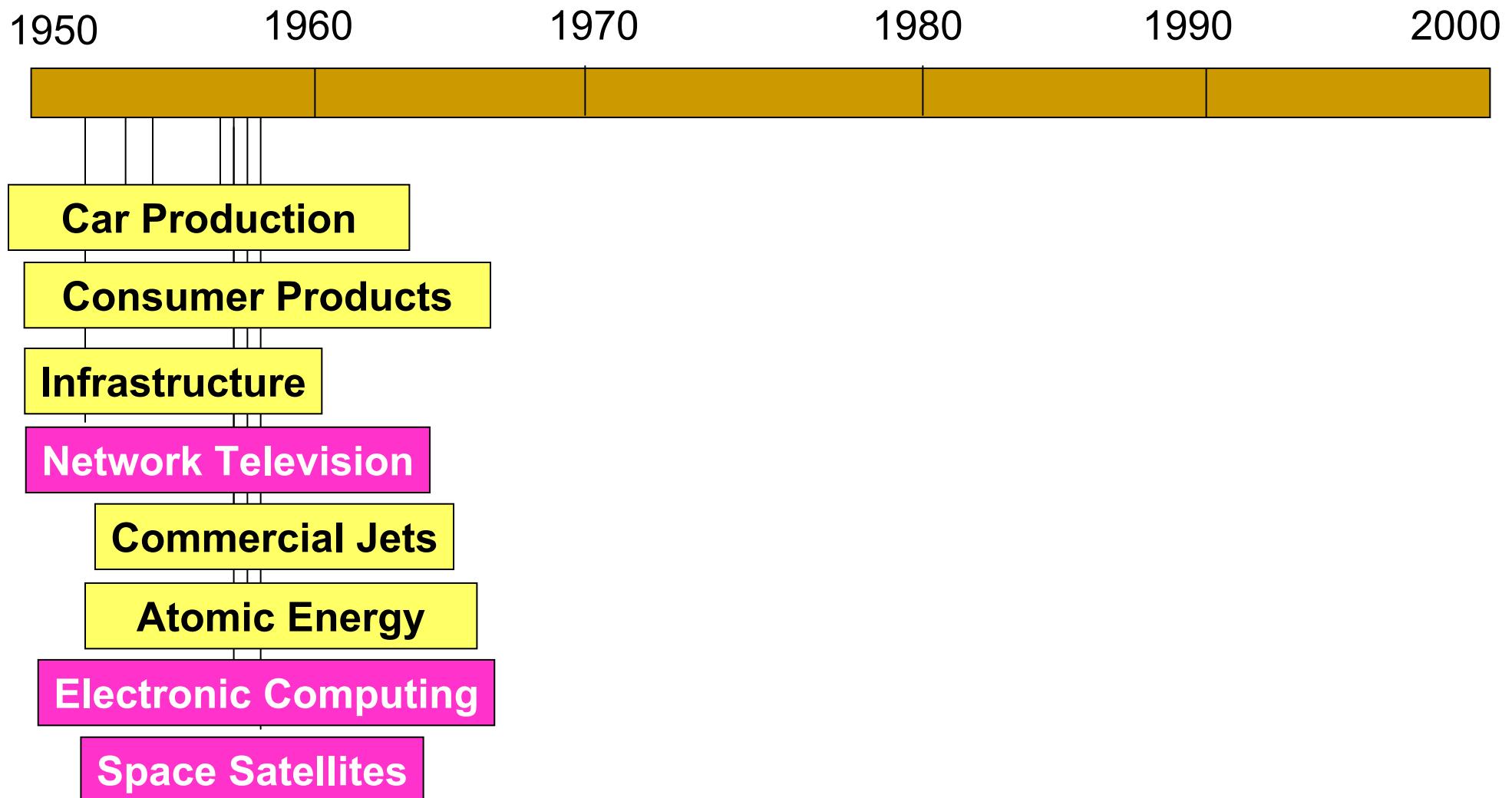
Article 30 Freedom from State or Personal Interference in the above Rights

Outcomes of World War II

- Technology can be used to support dictators, totalitarianism and purposes of pure evil
- Science-based weapons and their production are the key factors in modern warfare
- New capabilities for planet wide destruction
- Worldwide cooperation is necessary
 - United Nations formed in 1948
 - Introduces the Universal Declaration of Human Rights
- Renewed desire to build the world of the future, now called the “Postwar World,” but...

Futurism is never quite the same again!

The Postwar World Begins



Postwar World: Intervening Wars

1950 1960 1970 1980 1990 2000



Car Production

Consumer Products

Infrastructure

Korean War

Network Television

Commercial Jets

Atomic Energy

Electronic Computing

Space Satellites

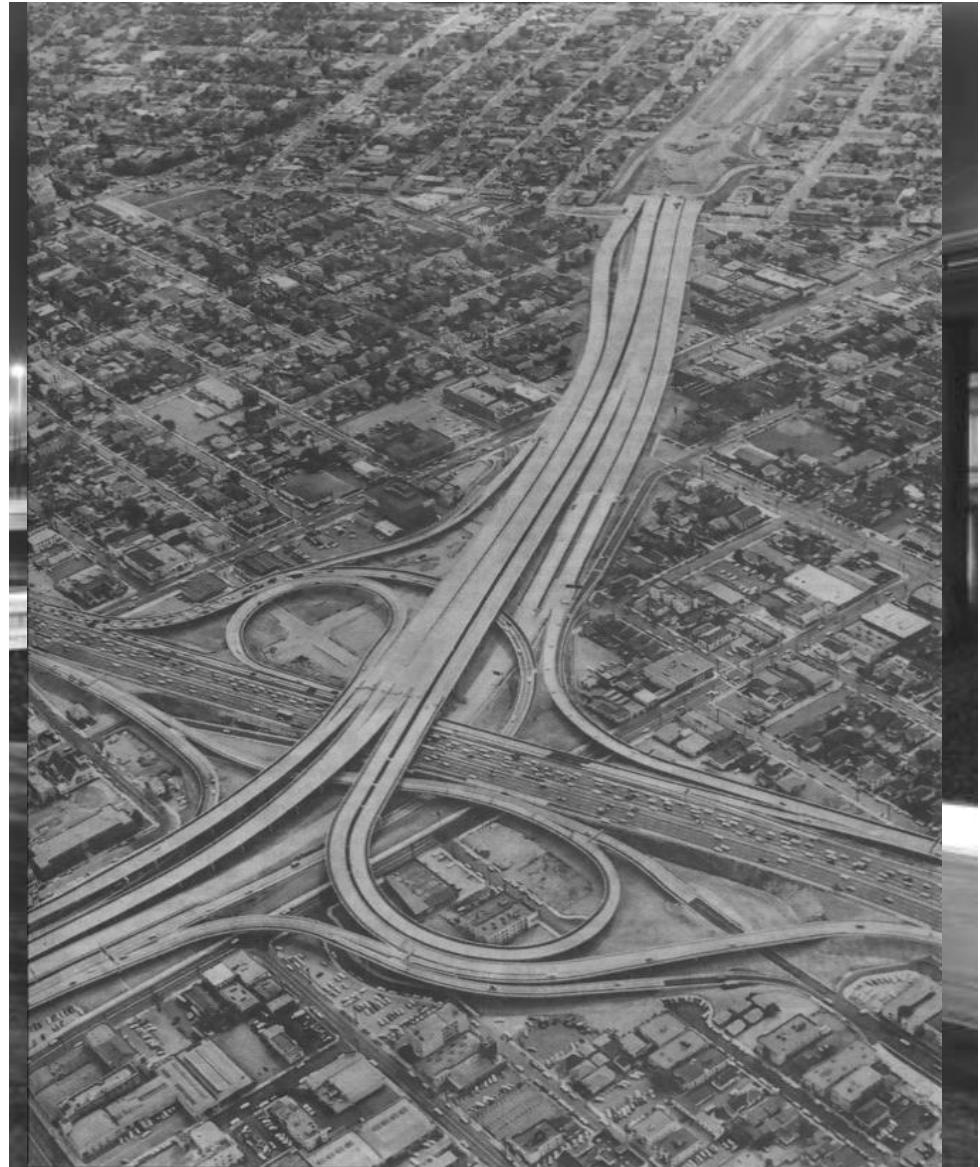


98,000 killed and 240,000 wounded



Growth Elements

- Tract Housing
- Infrastructure
 - Interstate highways
 - Urban freeways
 - Rise of the suburbs



Growth Elements

- Tract Housing
- Infrastructure
 - Interstate highways
 - Urban freeways
 - Rise of the suburbs
- Consumer Products
 - Television sets
 - Electric appliances
 - Transistor radios
- Automobile Manufacture
 - Ford, GM, Chrysler, Others
 - Steel and aluminum production
- Airline Transportation



Streetcars Disappear: Cars Dominate



The disappearance of Los Angeles' street cars is often ascribed to a grand conspiracy, but it was more likely the natural result of a growing car culture.

Television Appears: A Promise Fulfilled



- Public Forum
 - Political Conventions
 - Political Commentary
 - Daily News
- Entertainment for All
 - Good Drama and Comedy
 - New Sports and Pageants
 - "Soap Operas" Reimagined
- Advertisers' Paradise
- Newly Interconnected World
 - Real time, real life
 - Everybody seeing the same thing
 - "Seeing is believing"

Connectivity in Real Time...

Kathy Fiscus Trapped
April, 1949



KTLA TV responds with new
mobile transmitter unit



Los Angeles public watches 24 hr
real time television

...and Everyone is Watching

People watch TV on sidewalks in front of electronics stores



The TV set becomes the new focus of family life

Television is the next societal progression in communications
-- from oral, printing and radio

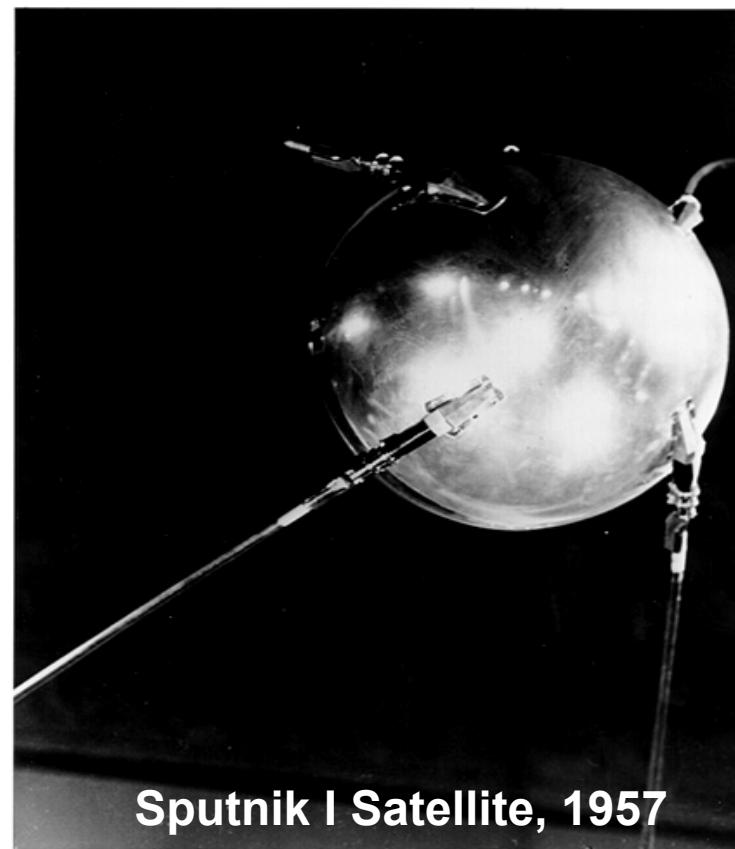
Technical Milestones

IBM 701 Mainframe, 1952



Thomas Watson, Sr. (seated,) the CEO of IBM, using the IBM 701 computer, the company's first fully electronic model. This computer had the ability to read/write magnetic tape, but at this stage it still relied mainly on punched cards for I/O. Nineteen 701's were installed during its 3 year lifespan at a lease rate of about \$15,000 per month. Many more 700s were to follow.

History changed on October 4, 1957, when the Soviet Union successfully launched Sputnik I. The world's first artificial satellite was about the size of a basketball, weighed only 183 pounds, and took about 98 minutes to orbit the Earth on its elliptical path.



Sputnik I Satellite, 1957

Bauhaus Evolves into Glass Towers



Seagrams Building, NYC, 1958



United Nations Building, NYC, 1962

Modernism Evolves: Into Mushroom Houses?



The Monsanto house was a showcase in Disneyland's Tomorrowland, 1957

The 'All-Electric Kitchen of the Future'



Marketing tries to turn Rosie the Riveter into a “Homemaker-Manager.”
But this is really not a very fulfilling role, and women soon realize it.

RCA/Whirlpool Miracle Kitchen, 1957

Auto Exuberance: 1950s “Happy Days!”



1956 Chevy Bel Air

1950 Imagines 2050: Futurism Lite

The Jetsons have:

- Advanced technology
 - Push button world
 - Flying cars
 - Robot helpers
 - Video everywhere
- Space age clothing
- 3-hr work days
- Conservative values
 - Breadwinner husband
 - Stay-at-home mom
 - All white family and neighbors
 - **Soon to be challenged!**



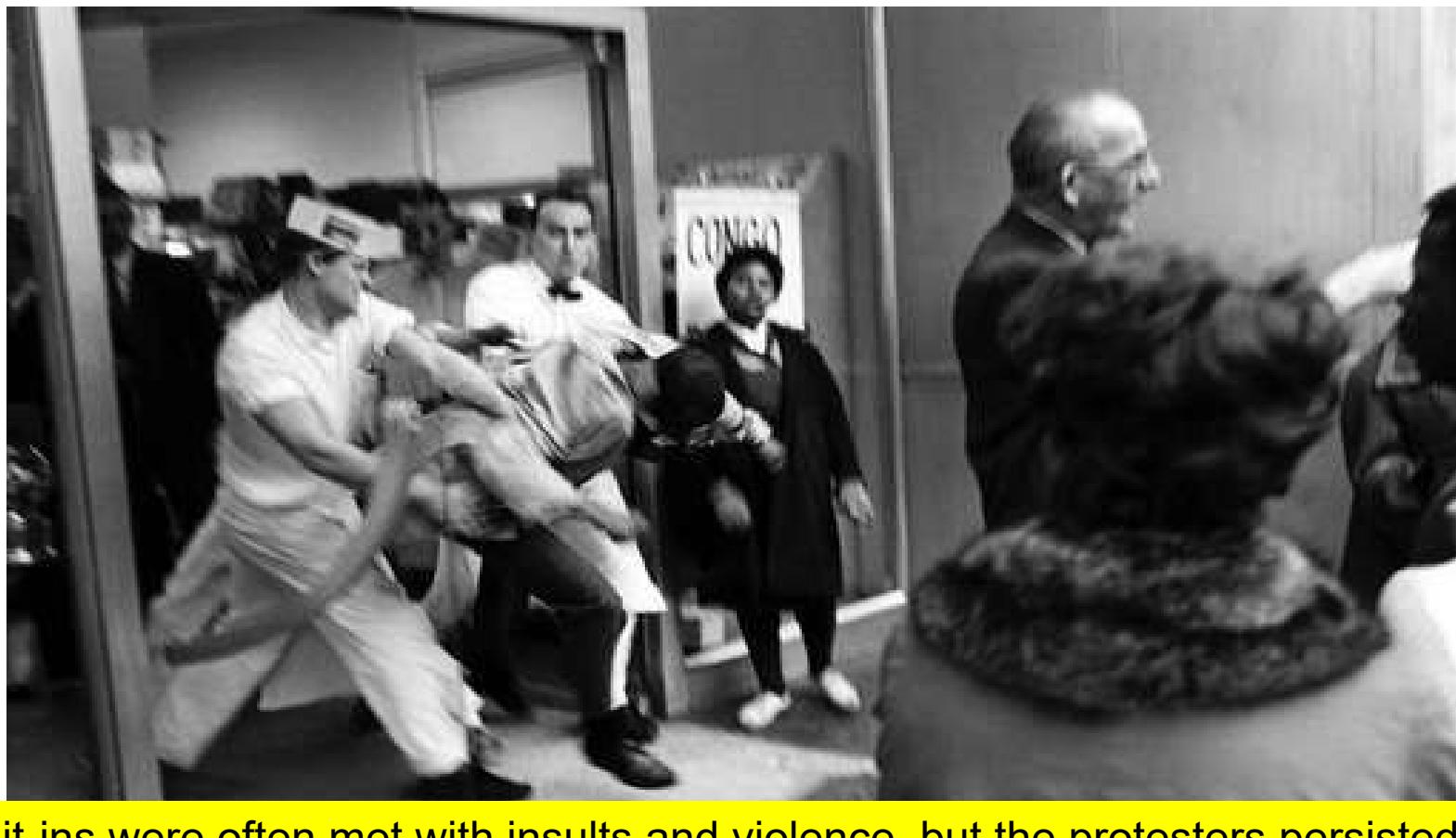
Societal Reactions: Black Civil Rights

RAF020204-2/2/60-GREENSBORO,N.C: A group of Negro students from North Carolina A&T College, who were refused service at a luncheon counter reserved for white customers, staged a sit-down strike at the F.W.Woolworth store in Greensboro 2/2. Ronald Martin, Robert Patterson and Mark Martin are shown as they stayed seated throughout the day. The white woman at left came to the counter for lunch but decided not to sit down. UPI TELEPHOTO fwb



After nearly 100 years of post civil war oppression and discrimination, African Americans demand to be treated as equal citizens in all respects.

Societal Reactions: Black Civil Rights



Sit-ins were often met with insults and violence, but the protesters persisted.

Societal Reactions: Black Civil Rights



March on Washington for Jobs and Freedom; August 28, 1963,



Rev. Martin Luther King, Jr.

The March on Washington convinced Congress that the movement was real.

Societal Reactions: Women's Rights as Well



Dick Gregory, Betty Friedan and Gloria Steinem march with Rep. Elizabeth Holtzman

Societal Reactions: Women's Rights as Well



The Civil Rights Act of 1964 prevented segregation and discrimination based on race, color, religion, sex or national origin.

The Voting Rights Act of 1965 prohibited racial discrimination in voting, and gave the Government the means to enforce the Act.

The Civil Rights Act of 1968 extended the laws against discrimination to housing, and so is referred to as the National Fair Housing Act of 1968

These major social advances were not made without violent counter-reactions.

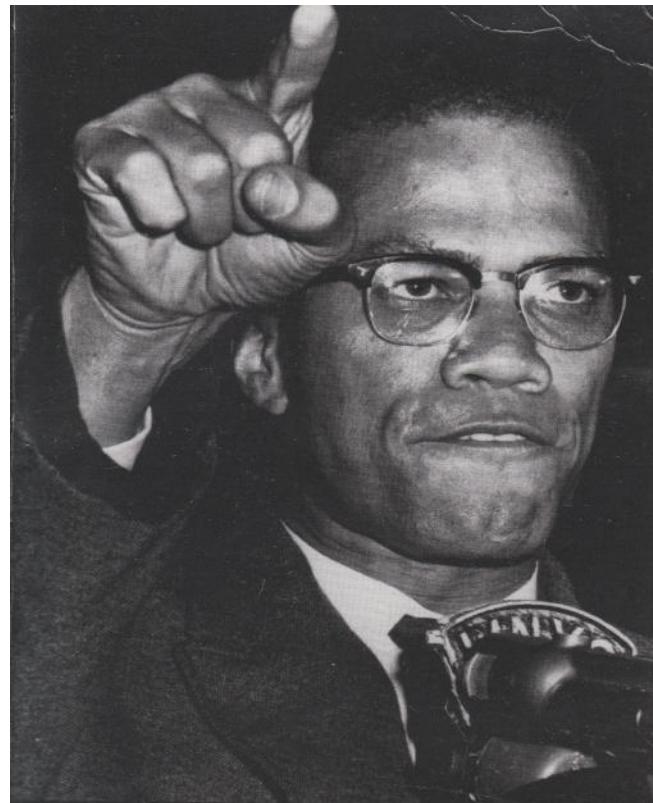


Dick Gregory, Betty Friedan and Gloria Steinem march with Rep. Elizabeth Holtzman

Societal Reactions: Political Assassinations



John Kennedy, Nov 1963



Malcolm X, Feb 1965

Societal Reactions: Political Assassinations



John Kennedy, Nov 1963



M.L. King, April 1968

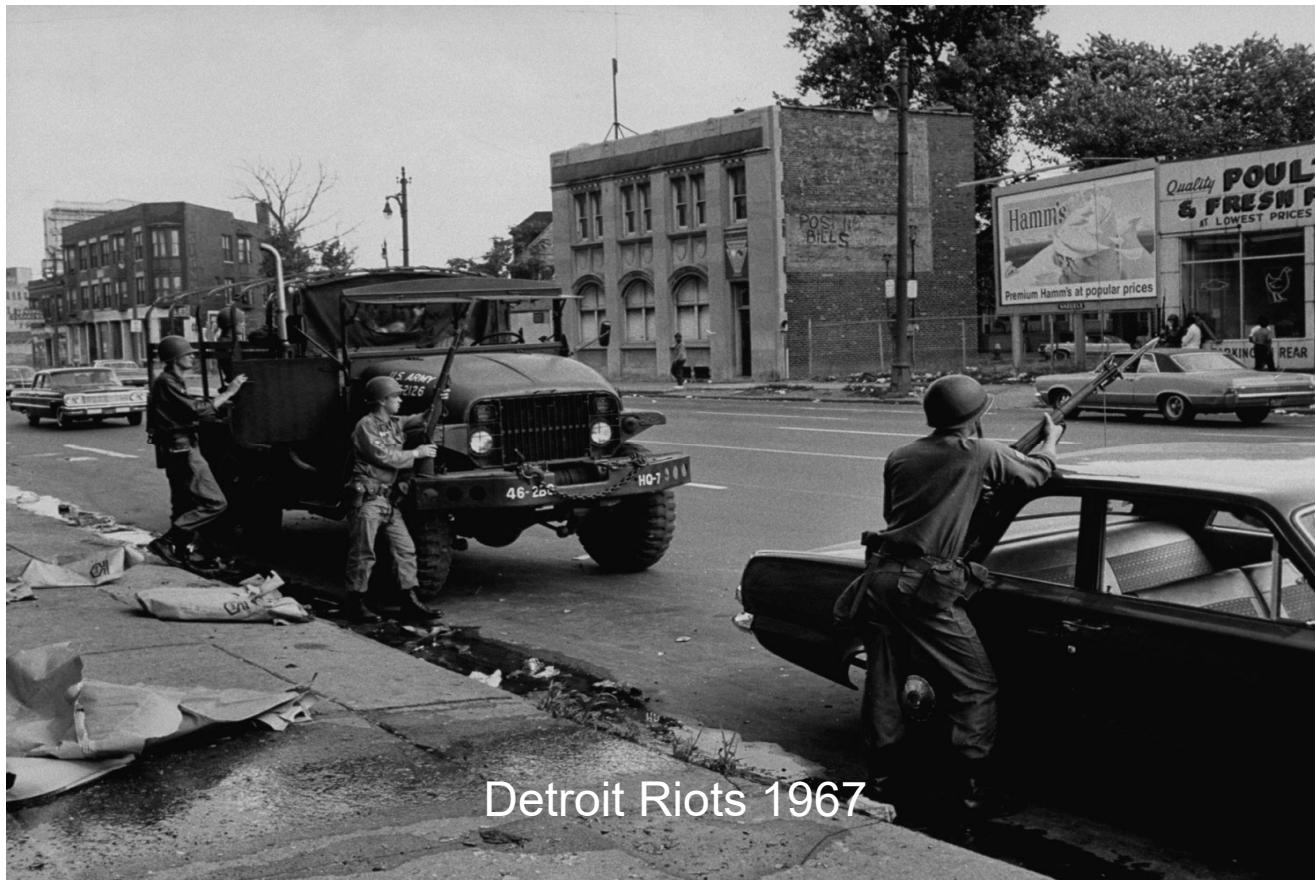


Robert Kennedy, June 1968

Societal Reactions: Warfare in the Streets



Societal Reactions: Warfare in the Streets



Detroit Riots 1967

Societal Reactions: Free Speech and Anti-War



Mario Savio and the UC Berkeley
Free Speech Movement, 1964



Abbie Hoffman and the Yippies
Anti-Vietnam War Movement, 1968

Societal Reactions: Free Speech and Anti-War



Anti-War Demonstrations at the Chicago Democratic Convention 1968

Societal Reactions: Free Speech and Anti-War



Anti-War Demonstrations at the Chicago Democratic Convention 1968

Societal Reactions: A Turning Point



Photo © John Filo

Kent State University, Ohio, May 4, 1970: Ohio National Guard Troops open fire on war-protesting students, killing four. US power wobbles on its axis.

Societal Reactions: A Turning Point



On May 15, 1970 Mississippi State Police fire on students at Jackson State University, killing two. This further solidifies widespread war and civil resistance.

Societal Reactions: Technological Effects

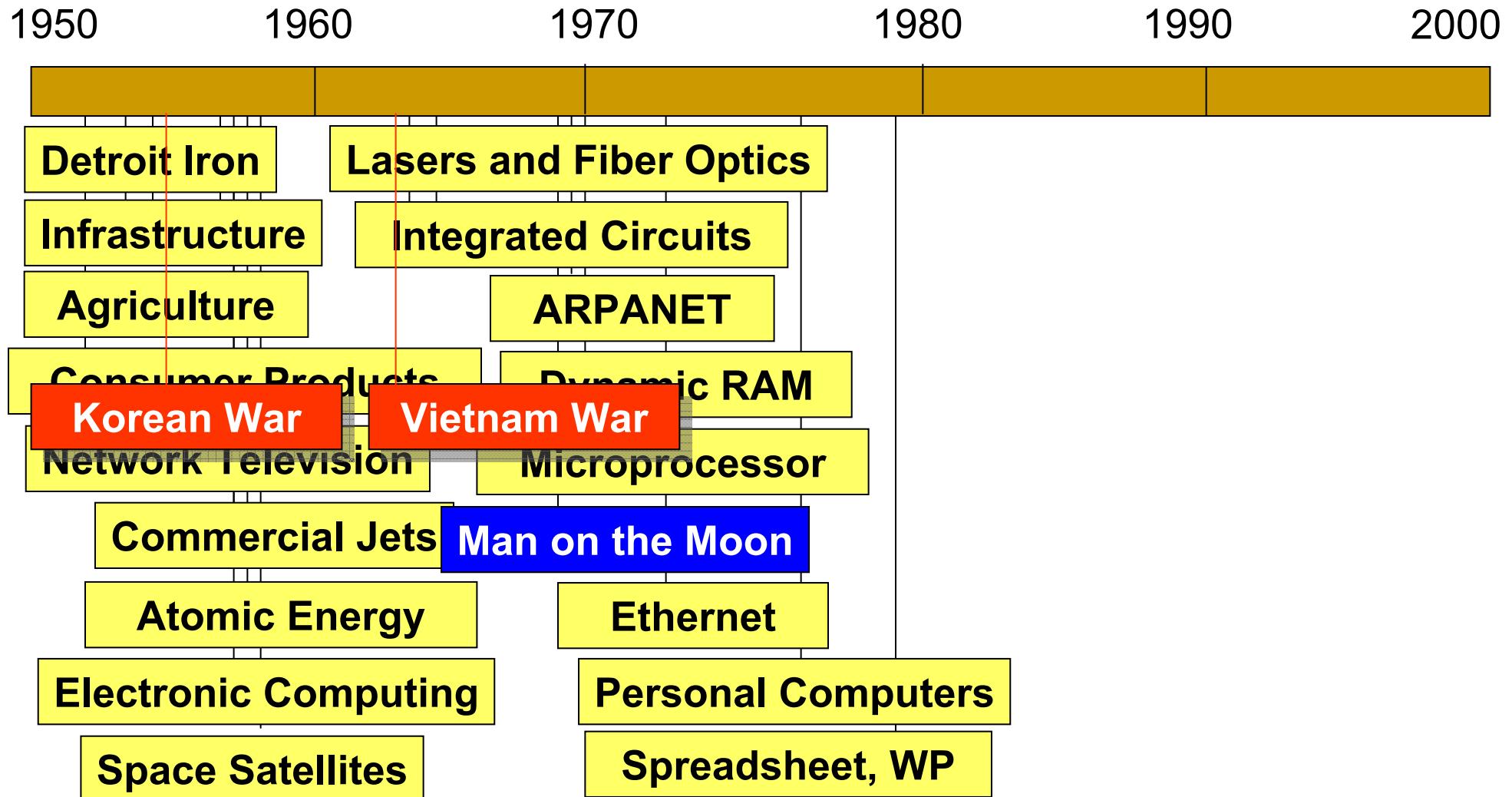
- 1962 **Rachel Carson, “Silent Spring”**
 - Effects of chemical pollutants on natural ecosystems
 - Beginning of environmental activism
- 1965 **Ralph Nader, “Unsafe At Any Speed”**
 - Corporate and engineering culpability in car accidents
 - Beginning of consumer activism
- 1967 **Marshall McLuhan “The Medium is the Message”**
 - Power of television and modern media
 - “The Global Village,” connectivity imagined

Societal Reactions: Technological Effects

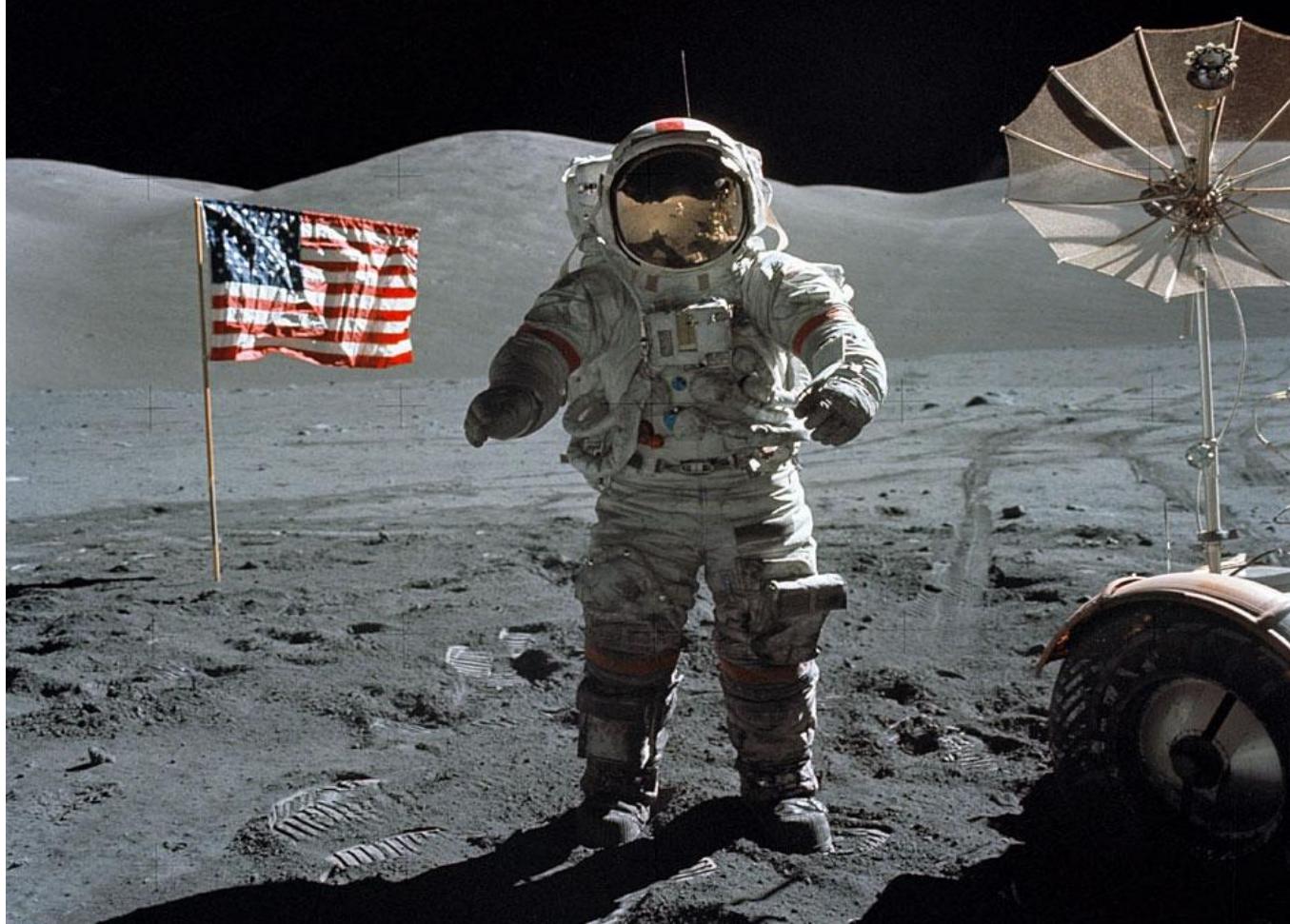
- 1962 **Risk Communication**
 - Effects of environmental pollution
 - Beginning of environmental movement
- 1965 **Corporate Social Responsibility**
 - Corporate social responsibility
 - Beginning of CSR
- 1967 **Media Coverage of Politics**
 - Power of media
 - “The Global Village, connectivity imagined”
- **1968 Joe McGinnis, “The Selling of the President”**
 - Lessons from the Kennedy-Nixon debate 1960
 - Politics and politicians as packaged products
 - Beginning of good hair, sound bites and voter apathy



Technology Timeline: Electronics Leads

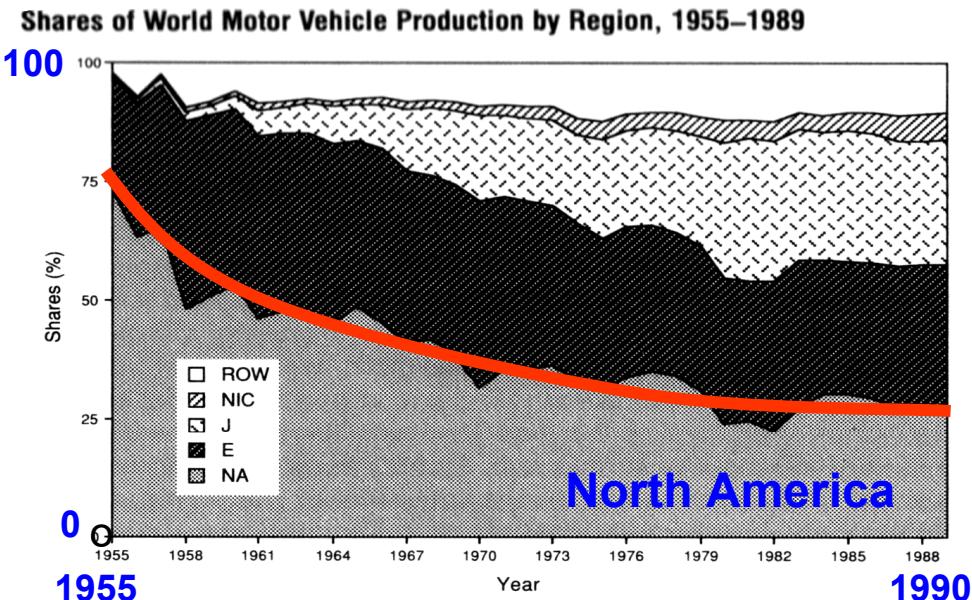


We Win the Space Race...For a While



July 20, 1969 Neil Armstrong and Buzz Aldrin walk on the moon:
“That’s one small step for man, one giant leap for mankind.”

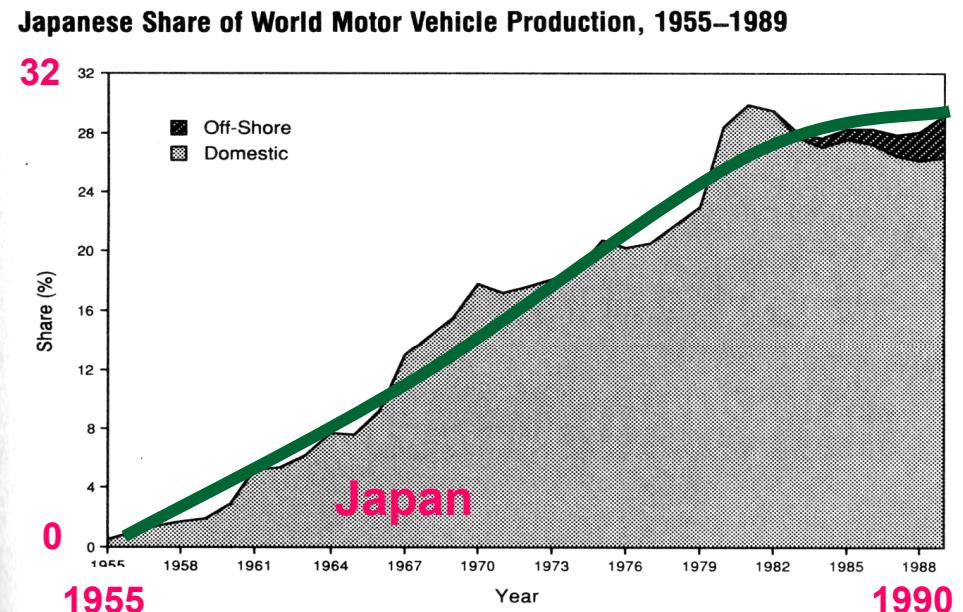
Car Production: Industrial Leadership Changes



Note: This figure includes all vehicles produced within the three major regions, by all companies operating in those regions. In addition, it groups the production of the newly industrializing countries and of the rest of the world.

NA = North America: United States and Canada
E = Western Europe, including Scandinavia
J = Japan
NIC = Newly industrializing countries, principally Korea, Brazil, and Mexico
ROW = Rest of the world, including the Soviet Union, Eastern Europe, and China

Source: Calculated by the authors from *Automotive News Market Data Book*, 1990 edition, p. 3.



Note: Includes both domestic and off-shore production.

Source: Automotive News Market Data Book

Japan is clearly doing something right. What is it?

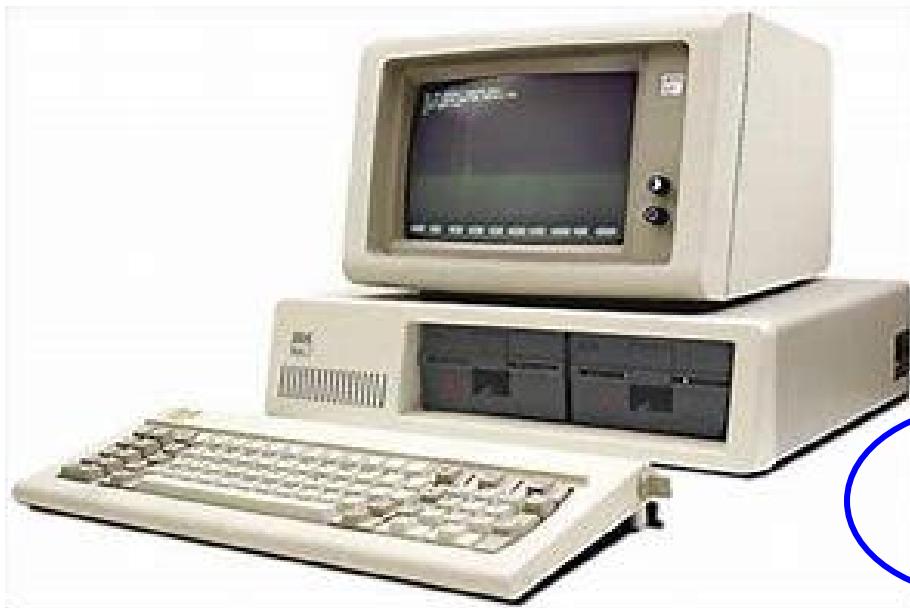
Mass Production vs. “Lean Production”

- Example: Changing Body Dies¹
 - MP: skilled workers, 24 hours
 - LP: standard workers, 3 minutes
- Elements of Lean Production
 - Meeting customer needs and desires
 - The factory as a total process
 - Emphasis on automation and robots
 - Coordinating the Supply Chain
 - “Statistical Quality Control” (W. E. Deming)
 - Bridging the ‘labor-management’ gap
- Sociological Effects
 - International manufacture – new countries
 - Outsourcing, off-shoring – lower labor costs, newer factories
 - De-unionization – lower wages, benefits, security and power



¹Womack, J.P, et al, “The Machine that Changed the World”, Rawson Assoc. NY, 1990

Computers Move to the Desktop...



1975 IBM PC



1984 Apple Macintosh

The migration from main frames and minis to PCs and Apples made the computer a consumer product and divided the “computer savvy” society from the not.

...and Telephones Move to the Street



1973 first phone call on a handheld cellular phone is made by Motorola engineer Martin Cooper from 6th Avenue between 53rd and 54th streets in New York City. *This is three blocks from Dr. Gershon Weltman's birthplace! Coincidence?*



1983 Motorola DynaTAC 8000X offered 30 minutes of talk-time, six hours standby, and could store 30 phone numbers. It cost \$3995.

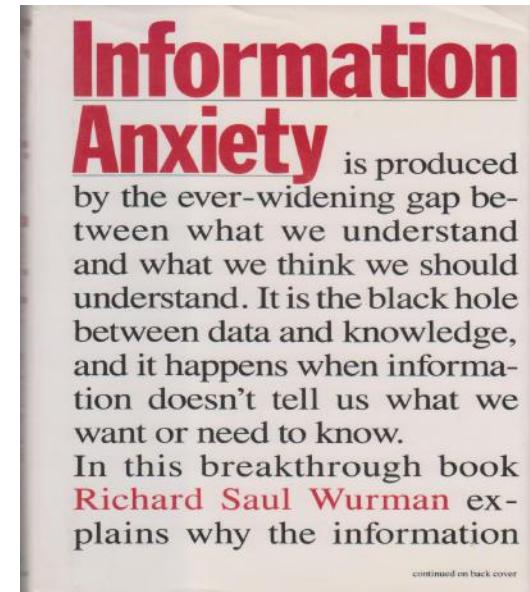
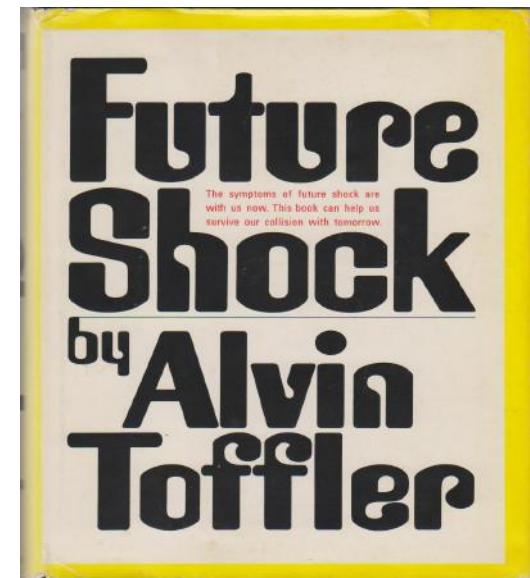


1989 Motorola MicroTAC

Mobile phones usher in a new era of personal communication, and are soon to join with computers to become Smart Phones.

Reactions to the Faster Pace

Commentators examine the societal and personal implications of the information revolution, characterized by rapid change and extensive new sources of data – and consider what can be done to achieve a “soft landing” in a future world.



Future Shock: Effects of Rapid Change

- Keeping Up
 - The accelerating pace of life, how to stay “with it”
- Transience
 - Throw-away society, new nomads, modular man
- Diversity
 - Too many products, subcultures and lifestyles
- Adaptability
 - Psychological and physical effects
- Survival
 - Coping skills
 - Education for tomorrow
 - Taming technology

“In the future, everyone will be famous for 15 minutes.”

Andy Warhol, Pop Artist, c.1975

Information Anxiety: Data without Meaning

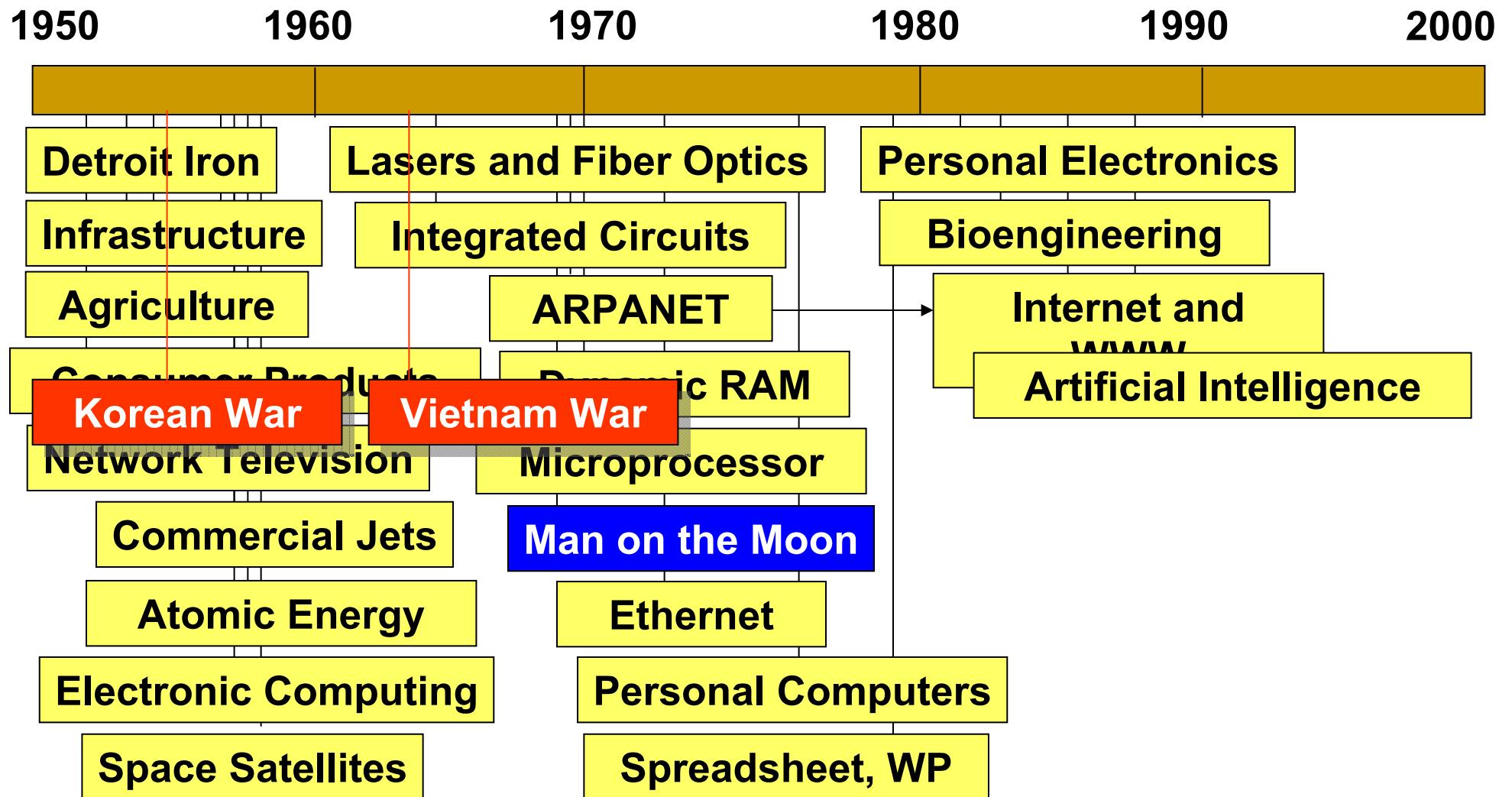
Richard Saul Wurman's Concerns:

- The Non-Information Explosion
- Language: Babel, Seduction, Content
- Landmines in the Understanding Field
- You Only Learn Relative to Something You Understand
- Cultural Information: Personal Vision
- The Map: Mankind's Ability to Perceive
- Technomania: Information as Commodity
- Prescription for Anxiety: Better Organization of Information

“The information explosion has backfired, leaving us inundated with facts but starved for information.”

Richard Saul Wurman

Technology Timeline: Some Harvesting...



...as the Cold War Ends...



www.dantoc.net

www.mon-photo.com

In 1989 the wall separating East and West Berlin came down, and the Soviet Union was in the final dissolution process. The Cold War was effectively over.

...Post-Modernism Begins



Frank Gehry, Disney Concert Hall, Los Angeles 1999



Daniel Libeskind, The Jewish Museum, Berlin, 2001



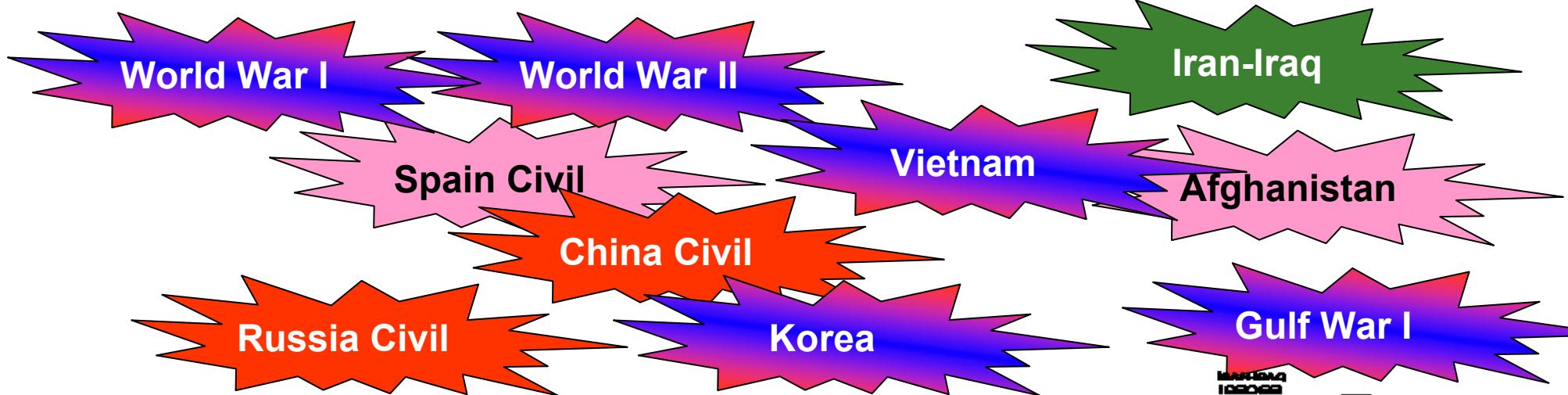
Philip Johnson, AT&T Building, NYC, 1984

20th Century Summary

- Revolutionary Progress....
 - The accelerating pace of change and acceptance
 - 50 Million radio users 38 years
 - 50 Million PC users 16 years
 - 50 Million Internet users 4 years
 - Building new technical “frameworks of reference”
 - Balancing technology’s expectations and realizations
- **Persistent Problems**
 - **A century of war and destruction**

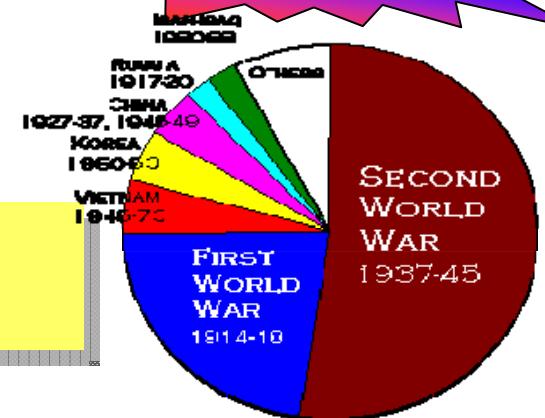
20th Century Wars

1900 1920 1940 1960 1980 2000



Estimated Total Military Deaths = **About 50 Million!**

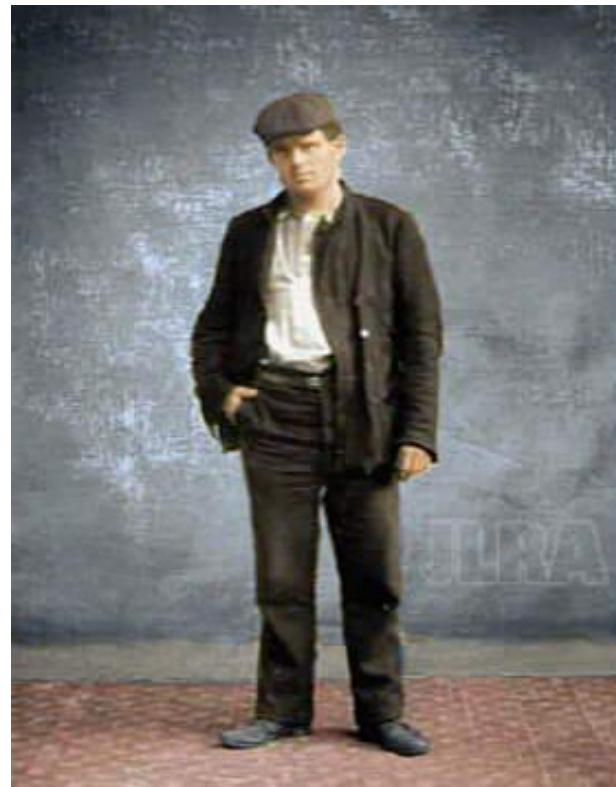
Estimated Total Civilian Deaths = **About 90 Million!**



20th Century Summary

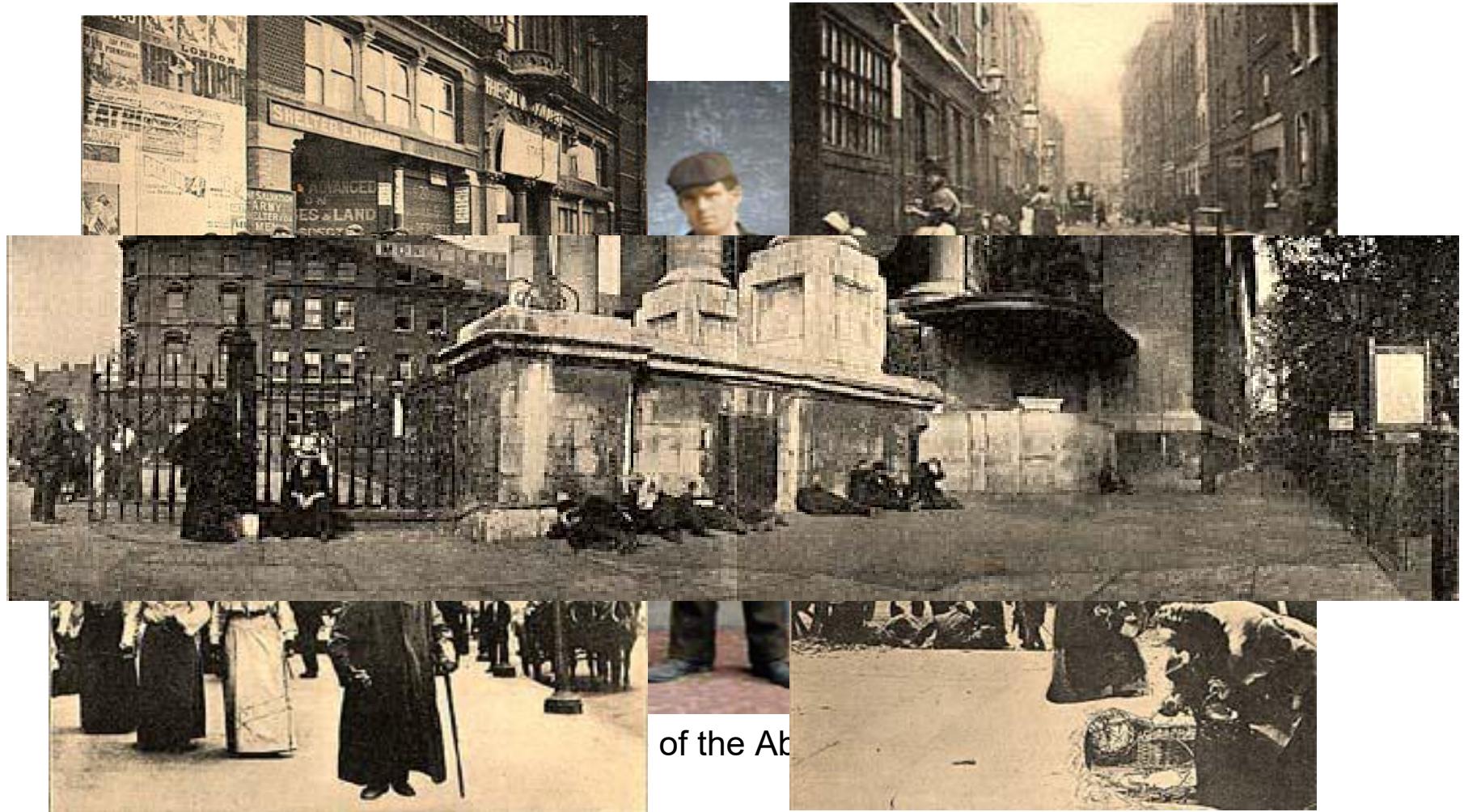
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 - **No solutions to long-standing societal inequities**

Poverty in London (1905)



Jack London, People of the Abyss, 1902-5

Poverty in London (1905)



of the Ab

Poverty in Los Angeles: 115+ Years Later!



Poverty in Los Angeles: 115+ Years Later!



Sidewalk homeless encampment just a few blocks from LA City Hall.

20th Century Summary

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 - A century of war and destruction
 - No solutions to some long-standing societal inequities
- **New Negative Reactions**
 - **Anti-Scientism: Against Enlightenment values and influence**
 - **Over-Protectionism: Preventing important experimentation**
 - **Disproportionism: Individual vs. Societal Well Being**
 - **Media Bias: Bad News and Pending Catastrophes**
 - **Declinism: We peaked and are going downhill**
 - **Agnostologistics: Elevation of ignorance and personal opinion**

Many 21st Century Dystopias...



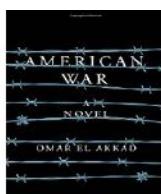
"The Handmaid's Tale" by Margaret Atwood (1985)

The upper classes are infertile, so "handmaids" are forced into sex and pregnancy by the autocratic rulers



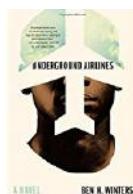
"NK3: A Novel" by Michael Tolkin (2017)

North Korean chemical attack has destroyed people's memories and their ability to reason



"American War: A Novel" by Omar el Akkad (2017)

Southern states refuse to abide by the 'Sustainable Future Act' and secede, triggering a general descent into barbarism



"Underground Airlines" by Ben H. Winter (2016)

Slavery is reestablished in the U.S. worse than ever, cities are re-segregated and the black population lives in misery



"The Book of Joan" by Lidia Yuknavitch (2017)

Survivors of a global war living on an earth satellite are killed at 50 because their bodies are the water supply

Many 21st Century Dystopias...



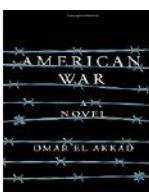
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"Dystopia used to be a fiction of resistance; it's become a fiction of submission, helplessness and hopelessness."

Jill Lepore. No, We Cannot. The New Yorker, June 5, 2017



"The Book of Joan" by Lidia Yuknavitch

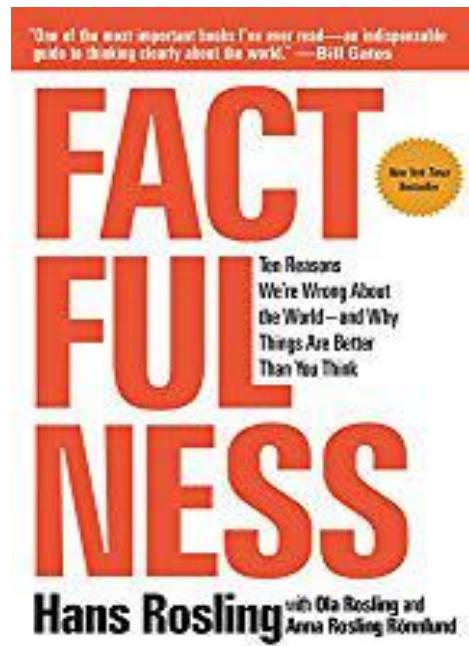
Survivors of a global war living on an earth satellite are killed at 50 because their bodies are the water supply

But Perhaps Some 21st Century Hope



In his 2011 book, author Steven Pinker argues statistically that the “Better Angels of our Nature” have been conquering our Inner Demons for centuries as a result of reason, science and knowledge. If true, this gives us considerable hope for the future.

But Perhaps Some 21st Century Hope



“Ten Reasons Why We’re Wrong About The World – and Why Things Are Better Than You Think”

Hans Rosling says the modern world is better than it ever has been: disease, crime, discrimination and most forms of pollution are in long-term decline, while longevity and education keep rising and economic indicators are better than in any past generation.

Test Your Knowledge of World Facts

To see how your view of the world matches up to reality, take the 13-question “factfulness” quiz at <http://factfulnessquiz.com/>

Then tell us how many you got right by answering 1 question at

Site: <https://onlinepoll.ucla.edu>

Poll: [Engr183EW–Factfulness](#)

Password: 1234

Be honest, *your* score is anonymous,
we’re just interested in the class statistics.