Early Industrialization

- Industrial revolution began during late 18th century in Britain and spread to the U.S in the early 19th century
- Economic change in energy source: Manpower to machine power, early inventions used water power, then started to use steam power
- Before revolution, energy source was usually from animals and humans
- Industrialization result of two types of change: Technological innovation and organizational changes
  - Technological innovations made it possible to produce goods by machines
  - Organizational changes moved the place of work to factories instead of homes and jobs
- Division of labor was now not based on agriculture needs, but on what was necessary to make the machine operate efficiently
- **Samuel Slater**- Opened the first industrial mill in 1790, borrowed heavily from British mills design
FIG. 124 upon the Working Beam. 9. The Pipe which brings Steam from the Boiler.

A New Steam Engine.

Acting both upwards and downwards, with a 30 inch cylinder and 8 feet stroke.

1. The Steam Case which surrounds the Cylinder
2. The Platform on which the Cylinder Stands
3. Beams which support it
4. Wall of the Condenser Room
5. Back wall of the Engine House
6. The Lower Wall
7. Doors and Windows
Inventions in transportation and communication in the early 19th century made it possible to transport goods faster and to transport information faster. One of these was the railroad.

The railroad was invented in England, but the technology found its way into the U.S. Railroads began to come into the United States in the early 1800s and at first, they were mostly for cargo or helping to move stone; things to help build canals, but soon they were also passenger rail stations.

During the early 19th century, the federal and state governments chartered private companies to build pikes or toll-charging roads usually in well-settled areas. Between 1800-1830, over 900 companies were charted by states to build roads.

One example is National Road, which began in Cumberland, Maryland. It facilitated the settling of western lands as migrants traveled west and livestock and produce traveled east toward population centers.

One problem with roads is that horse-drawn wagons were less efficient on getting goods to market than water unless it was a short distance.
Improvements in water transportation was more effective because it gave fewer expenses and less time. The major innovation is canals.

A canal is a relatively narrow, relatively shallow waterway but what was so important about it is that it connected major waterways for taking goods to market and allowed cargo barges to move across what otherwise would be really hard to navigate the territory.

One of the examples of a canal is the Erie Canal (which I will talk about it later). It was completed in 1825.
A Map of the Trenton and New Brunswick Turnpike Road.
The Revolution in Transportation

- James Watt's invention of the steam engine in Britain in 1764 inspired the development of a higher quality of iron so that the use of machinery spread to many industries, including transportation.
- During the early 19th century, inventors produced steam engines that could power locomotives and ships that revolutionized transportation.
- 1804 - Richard Trevithick developed the first steam-powered locomotive in Britain.
- First public railway line, the Rocket, opened in 1830 between Liverpool and Manchester, a distance of 32 miles.
  - The Rocket had a much better engine developed by George Stephenson, it travelled at 16 miles per hour.
- Within 20 years, locomotives could travel as fast as 50 miles per hour.
- Much larger loads can be carried, and amount of time required for travel was cut substantially.
- Thousands of miles of track would be built in Britain and eventually the U.S.
- Locomotives and steamboats dramatically lowered transportation cost.
- Steamboats greatly facilitated trade on rivers in the U.S, especially when canals started to be constructed.
The Canal Age

- From 1790 until the 1820s, or the turnpike era, Americans relied mostly on roads for internal transportation. But just using roads alone was not enough for the nation’s expanding needs, so starting in the 1820s, Americans improved by other ways of transportation.
- Large rivers like the Mississippi River has been an important route for transportation for years but there were problems, one of them being that it was hard to travel the upstream of Mississippi river, and flat barges which were sort of a raft that floated downstream laden with cargo and were broken up at the end of their journeys because they couldn’t navigate back upstream.
- And to return North, shippers had to send goods by land or by slow upstream vessels which took as long as 4 months to travel the Mississippi.
- In order to solve that problem, In 1807, inventor Robert Fulton came up with the steamboat which was much easier to power the ship and going against the tide of a river, so instead going down the Mississippi River to the port of New Orleans, it can also go back up the Mississippi River which means commerce can go more easily in both directions.
- As the number of steamboats grew, the development of passenger traffic which was significant, and more improved in the 1820s, Mississippi river became more important.
- New riverboats carried corn and wheat from Northwest and tobacco and cotton from southwestern farmers to New Orleans. And from there, oceangoing ships took the cargoes on to eastern ports.
Economic Advantages of Canals

- Before many Canals were being constructed, rivers were used by steamboats to transport goods.
- This caused dissatisfaction with the farmers to the west and merchants to the northeast, as farmers could pay less for transportation if they could ship their goods directly to the northeast markets, rather than by the river-sea route.
- The dissatisfaction could be solved with canals, making transporting directly to eastern markets cheaper, helping both the farmers and the merchants.
- 4 horses on a turnpike could only carry half a ton of goods, eighteen miles a day. 4 horses walking along a towpath next to canals while attached to barges can pull up to a hundred tons for 24 miles a day.
- By 1820s, the economic advantages of canals generated a booming interest in expanding the water routes to the west.
- Canals facilitated trade much faster and cheaper than turnpikes.
- Erie canal huge success, heavily used for trade.
- Canal connected cities like Chicago to New York, leading to more trade.
The Erie Canal

- New York legislature’s approval was needed for the construction of the Erie Canal. After the legislatures approved the construction, it began in 1817. Building the Erie Canal was the greatest construction project that the United States had ever taken.
- Erie Canal was a ditch that is 40 feet wide and 4 feet deep with towpaths along the banks, stretching 363 miles across upstate New York, connecting markets from the Great Lakes to New York City.
- The task was enormous, workers dug out endless amount of soil, constructing reservoirs, and quarrying rock to build the locks to raise and lower boats. Despite its harsh work labors, it was completed in 1825.
- Before the construction, the promoter of the canal New York Governor DeWitt Clinton predicted that it would make New York the major commercial center of the United States, and yes! New York gained a great deal of western trade as the journeys between New York and Buffalo was shortened from 20 to 6 days and the cost-reducing from $100 to $5.
- The Erie Canal was not just an engineering triumph, also an immediate financial success as well. By 1833 the canal was so successful that it had to be widened and deepened, and other states scrambled to build canals of their own.
The Early Railroads

- Railroads became the primary transportation system for the United States and remained until the interstate highway system in the mid 20th century.
- Early rails mostly used to connect water routes to land
- Entrepreneurs in America wanted better communication with the West, they quickly grew interested in the British railroads
- First company to begin operations in America was the Baltimore and Ohio Railroad, or the B&O railroad, one of the first rail lines in the United States. Its construction began on July 4, 1828, and first opened in 1830, made trades faster and cheaper. It inspired U.S to start investing more into railroads in the 1830s and 1840s.
- Most rails different gauges, not standardized
- Early railroads were short, schedules were erratic, wrecks were frequent
- Railroads made important advances in the 1830s and 1840s
  - The introduction of heavier iron rails improved the roadbeds.
  - Steam locomotives became more flexible and powerful
  - Redesigned passenger cars became more stable, more comfortable and larger
The railroads emerged from a combination of technological and entrepreneurial innovations. The technological breakthroughs included the invention of tracks, creation of steam-powered locomotives, and the development of railroad cars that could serve as public carriers of passengers and freight.

By 1804, both English and American inventors experimented with steam engines, in 1820, John Stevens ran a locomotive and cars around a circular track on his estate and in 1825, Stockton and Darlington Railroad in England opened short length of track and became 1st line to carry traffic.

American entrepreneurs, were interested in the experiment. So at 1830, B&O, became the first company to actually operate it and opened a 13 mile stretch of track.

In New York, the Mohawk and Hudson company began running trains in 1831. By 1836, more than 1000 miles of track had been laid in 11 states.

But it was not yet a true railroad system as most of them served simply to connect water routes, not to link one railroad to another, and the longest line was still comparatively short in the 1830s.

Though there were frequent wrecks and schedules were unpredictable, it still made important advances in 1830s and 1840s. Passenger cars were improved and redesigned, steam locomotives became more flexible and more powerful, and with the introduction of heavier iron rails, roadbeds were more improved.
Competition Between Railroads and Canals

- Railroads and canals were soon competing bitterly
- The Chesapeake and Ohio Canal Company blocked the advance of the Baltimore and Ohio Railroad through the narrow gorge of the Potomac
- New York prohibited railroads from hauling freight in competition with the Erie canal
- Railroads had so many advantages that when they were able to compete freely with other forms of transportation they almost always prevailed.
The Triumph of the Rails

- After 1840, railroads gradually supplanted canals and all other modes of transport. In 1840, there were 2818 miles of railroad tracks in the United States by 1850, there were 9021.
- The most comprehensive and efficient system was in the Northeast, which had twice as much trackage per square mile as the Northwest and four times as much as the south.
- Railroads were even reaching west of the Mississippi, which was spanned at several points by grante iron Bridges.
- One line ran from Hannibal to St. Joseph on the Missouri River, and another was under construction between St. Louis and Kansas City.
Consolidation

- Important change in railroad development was the trend toward the consolidation of short lines into longer lines
- Known as “trunk lines”
- By 1853, four major railroad trunk lines had crossed the Appalachian Mountains to connect the Northeast to the Northwest
- New York Central and New York and Erie gave New York City access to the Lake Erie ports
- Pennsylvania railroad linked Philadelphia and Pittsburgh
- B&O connected Baltimore and the Ohio River
- Chicago became the rail center of the West, served by 15 lines and more than 100 daily trains
- Financing Railroads: private investors provided necessary funds, and railroad companies borrowed sums from abroad
- Local governments contributed to railroads because they wanted them to help the states and the infrastructure
- Public land grants from the federal government: Senator Douglas of Illinois persuaded Congress to grant federal lands to Illinois Central; by 1860, Congress had given over 30 million acres to 11 states to assist railroad construction
- Appearance of the great trunk lines tended to divert traffic from the main water routes like the Erie canal and Mississippi River
- By lessening the dependence of the West on the Mississippi, the railroads helped weaken the connection between the Northwest and the South
Map of Chicago circa 1850
Innovations in Communication and Journalism

- Magnetic telegraphs was also an important innovation in communications, telegraph lines extended along the tracks, connecting one station with another in aiding the scheduling and routing of trains.
- It also permitted instant communication between distant cities.
- It also helped reinforce the schism between North and South; like railroads, they were more extensive in the North and telegraphs helped similarly to link the North to the Northwest.
- Associated press also invented, able to spread newspaper faster.
Newspaper from 1850s
The Telegraph

- Telegraph invented by Samuel F. B. Morse in 1844 after several years of experimentation.
- The relatively low cost of constructing wire systems made the Morse telegraph seem like the ideal answer to the problem of long distance communication.
- 1860: more than 50,000 miles of wire connected parts of the country.
- A year later, the Pacific Telegram connected New York City and San Francisco by 3,595 miles of wire.
- By then, nearly all independent lines had joined in one organization: the Western Union Telegraph Company.
- Morse Code was invented because the telegraph worked by sending pulses down copper wires and so it made it easy to communicate through coded messages of dots and dashes. Dots and dashes corresponded with letters which allowed them to send messages over extremely long distances, so they could send messages by telegraph in an instant, as opposed to sending a letter, which might take days or even weeks to get to its destination.
In less than six months, when the telegraphic wires shall be completed to New Orleans, and to other points, we expect to publish intelligence fifteen hundred or two thousand miles distant, the day after it transpires at all the different extremities of the republic.

The following is a table of the electric wires finished, in progress, and contemplated, as far as is known:

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<tr>
<th>Lines of Telegraph Finished</th>
<th>Miles</th>
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<tbody>
<tr>
<td>From New York to Albany</td>
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<tr>
<td>Albany to Utica</td>
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<tr>
<td>Utica to Syracuse</td>
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<td>Syracuse to Auburn</td>
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<td>Milwaukee to Chicago</td>
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The Associated Press

- In 1846, Richard Hoe invented the steam cylinder rotary press, making it possible to print newspapers rapidly and cheaply and made distribution of news much easier.
- The development of the telegraph, together with the introduction of the rotary press, made possible much speedier collection and distribution of news than ever before.
- Newspaper publishers created the Associated Press by wire but now they didn’t have to depend on the cumbersome exchange of newspapers for out of town reports.
- Newspapers emerged in Northeast.
- In New York, Horace Greeley’s Tribune, James Gordon Bennett’s Herald, Henry Raymond’s Times.
Fueling Sectional Discord

- Rise of journalism helped to feed sectional discord
- Most major magazines and newspapers were in the north, reinforcing the South's sense of subjugation
- Southern Newspaper tended to have smaller budgets and reported largely local news
- Few had any impact outside of their local communities
- The combined circulation of the Tribune and the Herald exceeded that of the daily newspapers published in the south put together
THE NORTH STAR.

RIGHT IS OF NO SEX—TRUTH IS OF NO COLOR—GOD IS THE FATHER OF US ALL, AND ALL WE ARE BRETHREN.

ROCHESTER, N. Y., FRIDAY, JUNE 2, 1848.

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Links Between the Midwest and the Northwest

- During the years between 1815 and 1860, railroads and canals linked the Northeast and the Midwest, with railroads becoming more important than canals by the end of the era.
- The Erie Railroad and Pennsylvania Railroad connected the Atlantic ports (New York, Philadelphia, and Boston) with the great Lakes cities of Cleveland and Chicago.
- During the 1850s, a railroad boom extended lines into the countryside and lowered the cost of shipping farm products to markets.
- New farms popped up on prairie lands of the midwestern states as transportation connections improved.
- In contrast to the rural South, the Midwest began producing its own manufactured goods as early as the 1830s.
- **John Deere**, a blacksmith in a small Illinois town, made his first steel plow in 1837 and opened a factory ten years later.
- Deere's steel plows were stronger than the earlier cast-iron models, and the industry grew rapidly.
- Other midwestern companies mass-produced reapers that hastened the harvesting process, and soon wheat from the Midwest flowed into the eastern and European markets.