What is congestion?
Congestions means: demand exceeds supply (people/vehicles waiting in line to pass through)
- The temporal dimension
- The spatial dimension

Causes of congestion
- Economic efficiency
- Human interaction

Density
- Attracts talents and sharpen them through competition
- Facilitates face-to-face interaction
- Generates ideas
- Encourages entrepreneurship
- Allows social and economic mobility and
- Generates congestion
Causes of congestion

Regularity as a biological need
Causes of congestion

- Capacity too low
- Demand is not well managed
- Accidents

Between 1993 and 2002, rural Interstate lane miles grew by 0.2 percent annually, small urban Interstate lane miles grew at 1.0 percent annually, and urbanized Interstate lane miles grew by 0.9 percent annually.
Causes of congestion vary spatially and temporally
So the solution should vary spatially and temporally

Ways to cope with congestion
1. Increase supply
2. The concept of triple convergence
   1. Spatial convergence
   2. Temporal convergence
   3. Modal convergence
3. Induced demand

10% rise in lane mile capacity → 5.6% in VMT
10% rise in VMT → 3.3% in lane mile capacity

Ways to cope with congestion
2. Manage demand
   Road pricing

Congestion pricing
- Also called “value pricing”—pricing is based on the level of congestion (the more congestion the road is, the higher the pricing is) to improve traffic flow and reduce delays and other negative consequences with congestion

SEATTLE -- A consultant hired by the Seattle Department of Transportation says there has been a "clear lack of focus" in planning how to manage the large number of vehicles that will divert to avoid paying tolls on the Highway 99 tunnel replacement for the Alaskan Way Viaduct. It says "travelers able to afford toll rates will find driving much more convenient, while those using transit due to income restrictions or personal choice, may be faced with slower and less reliable travel due to traffic diversion from the freeway to city streets," the report says.
Types of tolling

- **Varily priced lanes**, involving variable tolls on separated lanes within a highway, such as Express Toll Lanes or HOT Lanes, i.e., High Occupancy Toll Lanes
- **Variable tolls on entire roadways** – both on toll roads and bridges, as well as on existing toll-free facilities during rush hours
- **Cordon charges** – either variable or fixed charges to drive within or into a congested area within a city
- **Area-wide charges** – per-mile charges on all roads within an area that may vary by level of congestion

Variable tolls

Flat toll rates are changed to a variable toll schedule so that the toll is higher during peak hours and lower during off-peak hours

- **Cordoning**
  - Charging a fee to enter or drive within a congested area

<table>
<thead>
<tr>
<th>Time</th>
<th>Priced</th>
<th>Free</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 a.m.</td>
<td>$1.30</td>
<td>Free</td>
</tr>
<tr>
<td>7:30 a.m.</td>
<td>$2.07</td>
<td>$1.60</td>
</tr>
<tr>
<td>8:00 a.m.</td>
<td>$2.70</td>
<td>$2.07</td>
</tr>
<tr>
<td>9:00 a.m.</td>
<td>$3.30</td>
<td>$2.70</td>
</tr>
<tr>
<td>10:00 a.m.</td>
<td>$3.70</td>
<td>$3.07</td>
</tr>
<tr>
<td>11:00 a.m.</td>
<td>$4.00</td>
<td>$3.30</td>
</tr>
<tr>
<td>12:00 p.m.</td>
<td>$4.30</td>
<td>$3.60</td>
</tr>
<tr>
<td>1:00 p.m.</td>
<td>$4.60</td>
<td>$3.90</td>
</tr>
<tr>
<td>2:00 p.m.</td>
<td>$4.90</td>
<td>$4.20</td>
</tr>
<tr>
<td>3:00 p.m.</td>
<td>$5.20</td>
<td>$4.50</td>
</tr>
<tr>
<td>4:00 p.m.</td>
<td>$5.50</td>
<td>$4.80</td>
</tr>
<tr>
<td>5:00 p.m.</td>
<td>$5.80</td>
<td>$5.10</td>
</tr>
<tr>
<td>6:00 p.m.</td>
<td>$6.10</td>
<td>$5.40</td>
</tr>
<tr>
<td>7:00 p.m.</td>
<td>$6.40</td>
<td>$5.70</td>
</tr>
<tr>
<td>8:00 p.m.</td>
<td>$6.70</td>
<td>$6.00</td>
</tr>
<tr>
<td>9:00 p.m.</td>
<td>$7.00</td>
<td>$6.30</td>
</tr>
<tr>
<td>10:00 p.m.</td>
<td>$7.30</td>
<td>$6.60</td>
</tr>
<tr>
<td>11:00 p.m.</td>
<td>$7.60</td>
<td>$6.90</td>
</tr>
<tr>
<td>12:00 a.m.</td>
<td>$7.90</td>
<td>$7.20</td>
</tr>
</tbody>
</table>

*Prices for travel within Stockholm varies according to time of day, with higher fees during peak hours. Dollar value converted from Swedish krona at current rates.*
Ways to cope with congestion

2. Manage demand:
   Through creating dense, diverse neighborhoods

By the way, will this work well?

Ways to cope with congestion

Or maybe,

Congestion cannot be reduced through mixed land use development

Congestion is not such a big problem
Can we do something with congestion?

- Congestion cannot be eliminated,
- But its degree can be lessened and its rate of increase can be reduced