



JACOB INNOVATIONS, LLC

# Seating Innovations Via Usage of Vertical Space



[jacob-innovations.com](http://jacob-innovations.com)

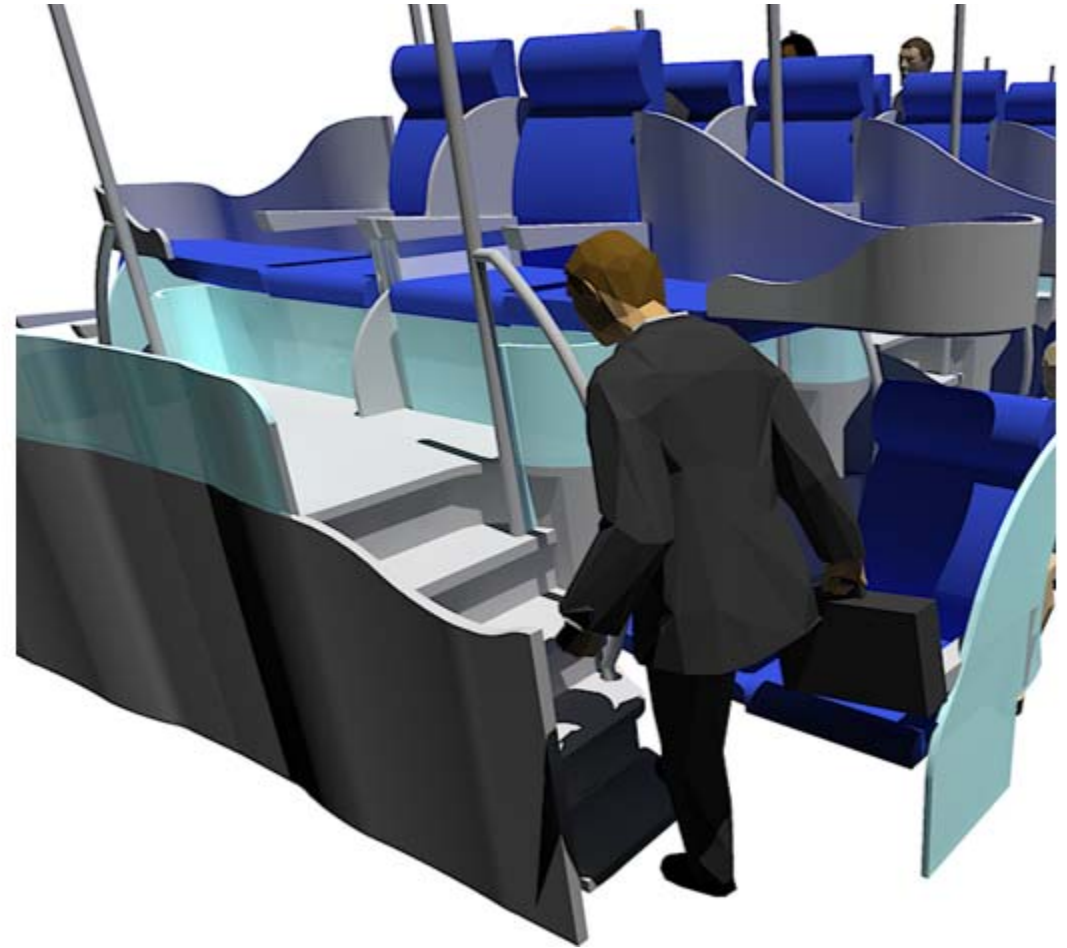
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**Emil Jacob**, MDS (c) - Design for Human Health  
President, Designer  
Jacob Innovations, LLC



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# GOALS



- Capture vertical space to improve comfort and density
- Increase perceptions of personal space
- Growing profits



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# THE PROBLEM

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## Your airplane seat is going to keep shrinking

by Christopher Elliott   @elliottdotorg   SEPTEMBER 12, 2015, 11:00 AM EDT



**Consumer groups are fighting to get airlines to stop shrinking seats, but federal regulators still won't act.**

Photograph by Gene Chutka — Getty Images

1970

Today

### Seat pitch

35 inches

31 inches

### Seat Width

18 inches

16 ½ inches



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# THE PROBLEM: DISCOMFORT

Would you fly more frequently if airplane seats were more comfortable?



## The Future of Airline Seating

by [Matthew Link](#)

Posted Jul 27th 2010 05:04 PM



## Seat recline fight diverts another flight

By [Katia Hetter](#), CNN

Updated 10:57 AM ET, Wed September 3, 2014



## U.S. congressman proposes law to limit shrinking airline seats



By [Thom Patterson](#), CNN

Updated 4:45 PM ET, Wed February 10, 2016



*Rep. Steve Cohen, D-Tennessee, has proposed mandatory federal minimum size standards for airline passenger seats.*



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## THE SOLUTION: available vertical space



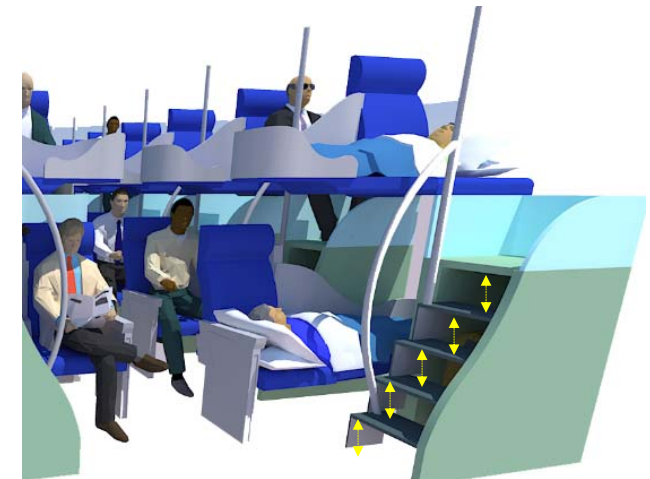
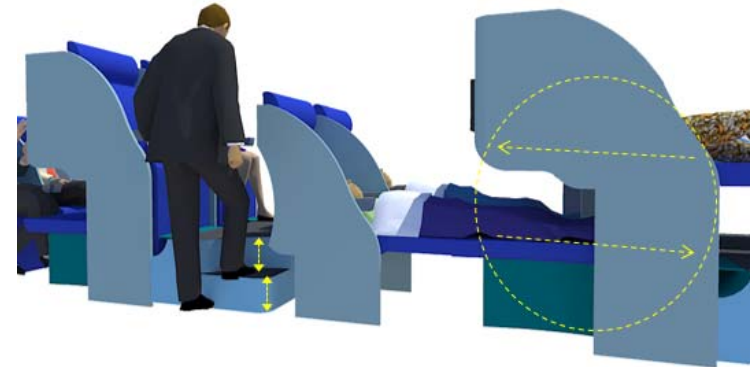
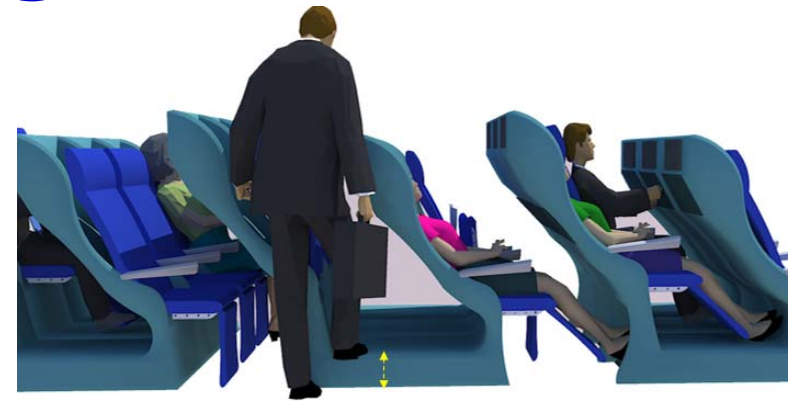
boeing-787



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# Proposed designs

- **Economy Class:** improved reclining and leg room with minimal loss in density.
- **Business Class:** Increased density
- **Sleeper Class:** new class with affordable sleeping accommodations





# Alternate Elevated Seats Improving Comfort in Economy Class (1-StepSeat)

Capturing vertical space:

- 7" differential in height for every alternate seat

	Degrees of recline	Seat Pitch
Economy	(24°)	31"
Premium Economy	(32°)	38"
StepSeat (proposed)	(45°)	31"





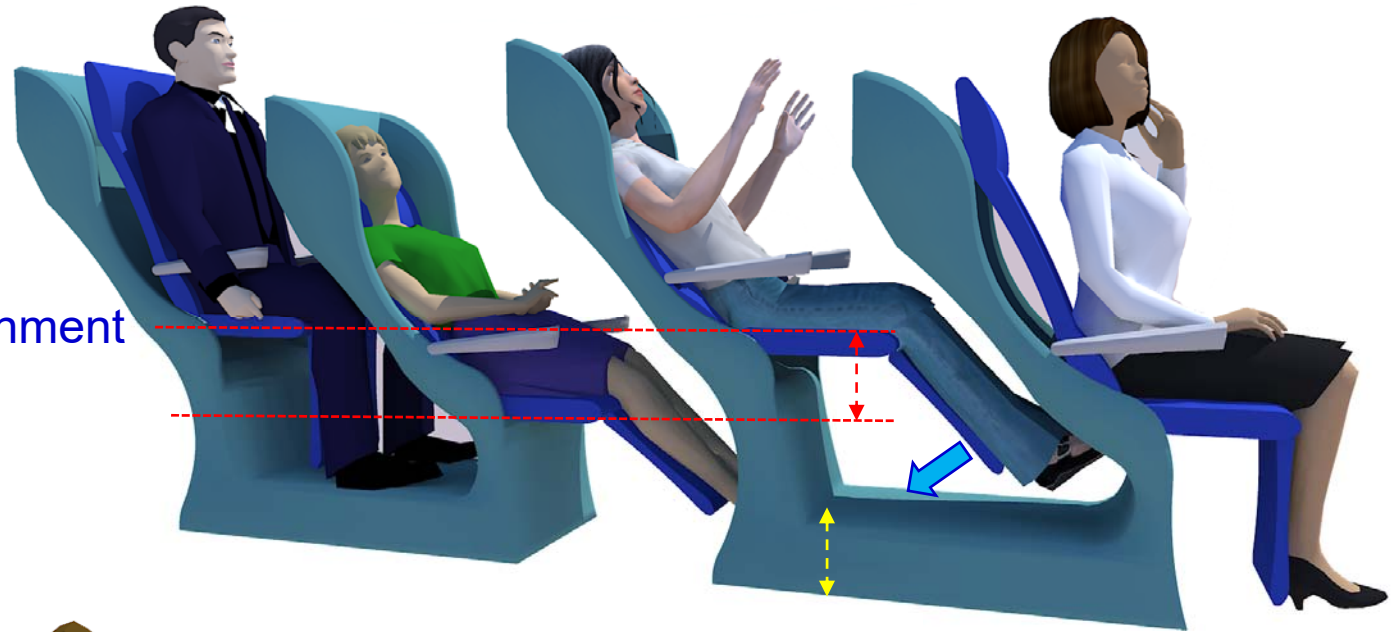
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## Improving Comfort in Economy Class (1-StepSeat)

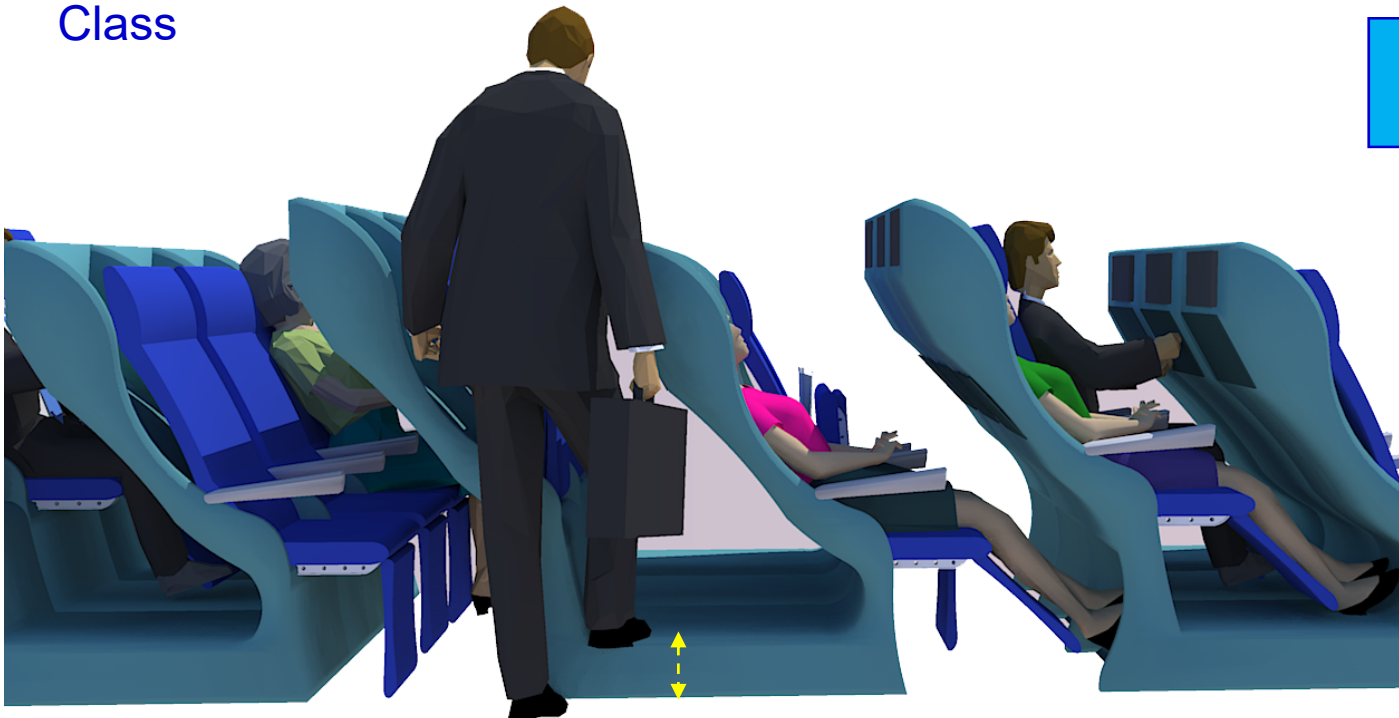
### Fixed Shells

- ✓ Eliminate encroachment
- ✓ Create privacy

Option to increase density in Economy Class



Foot rest as means for exercise





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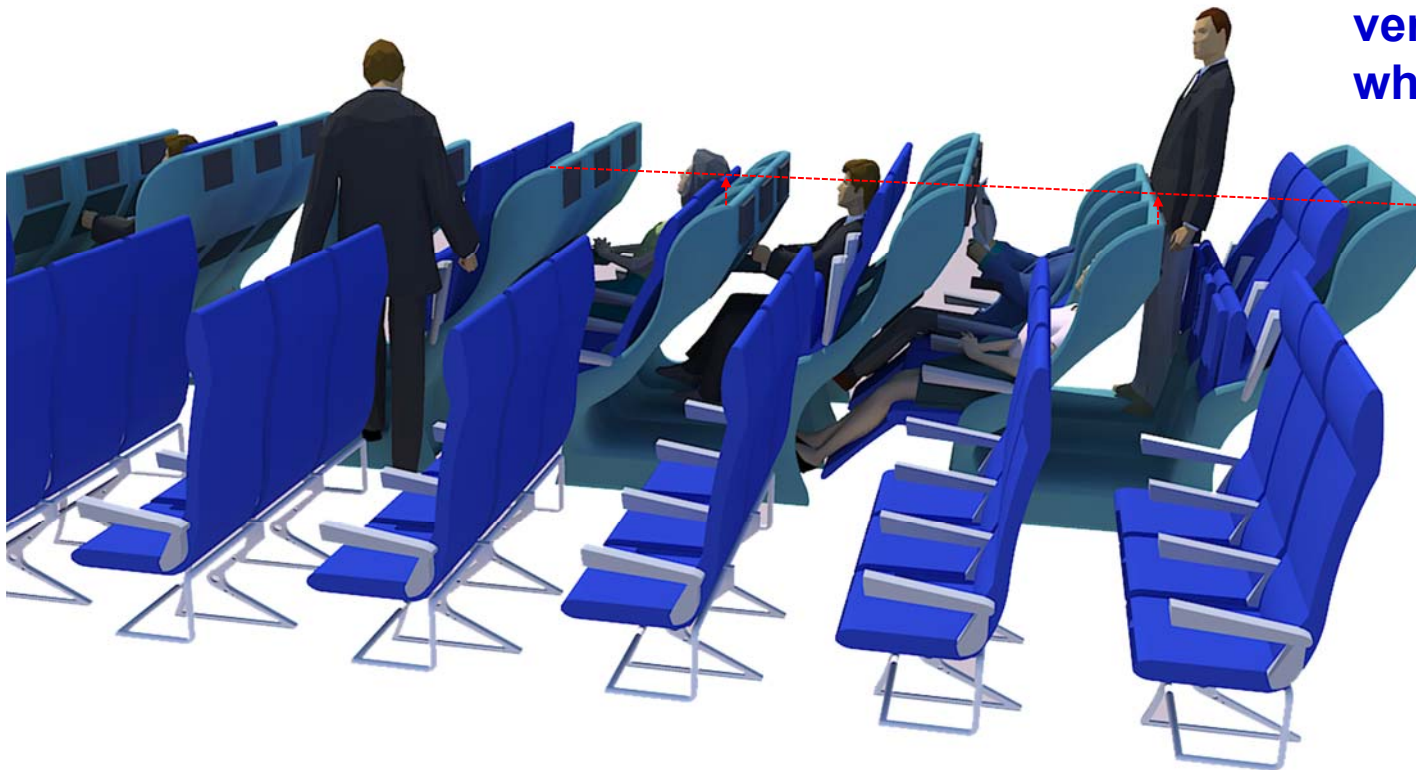
## Improving Comfort in Economy Class (1-StepSeat)

### Premium Economy Comfort in Economy Class Density

Sleeping conditions improved with minimal loss in density

- 45 degree recline
- 45 degree foot rest
- Shells provide a level of privacy when reclined

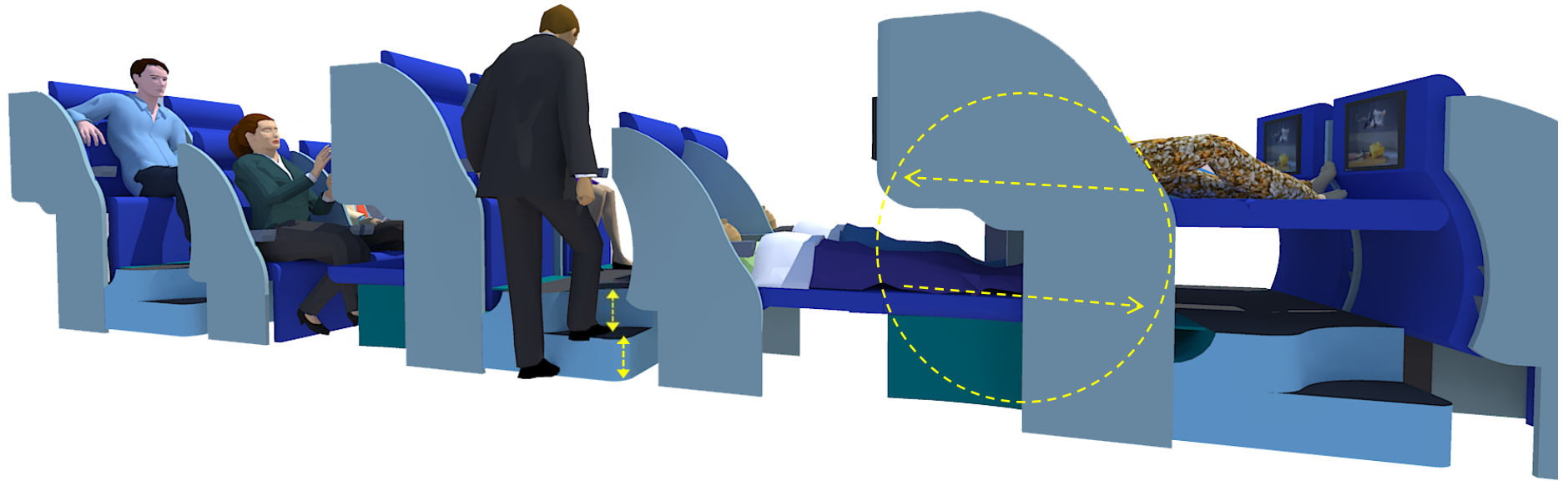
**Seat moves to vertical position when empty**





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## Improving density in Business Class (2-StepSeat)



Every Alternate seat is higher by two steps (7"x2)



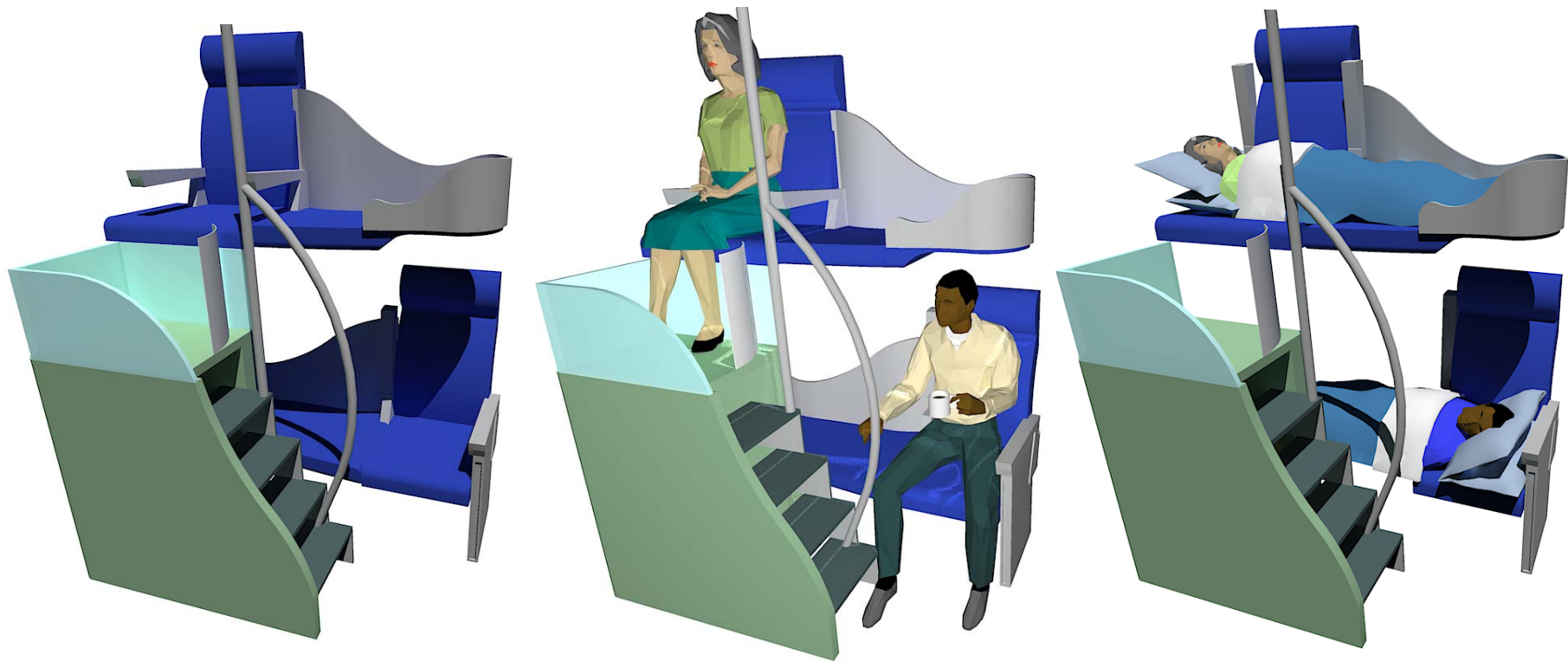
- New reclining space & legroom becomes available
- Significant increase in business class density



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## Sleeper Class (5-StepSeat)

**Sleeper Class: new class with affordable sleeping accommodations**



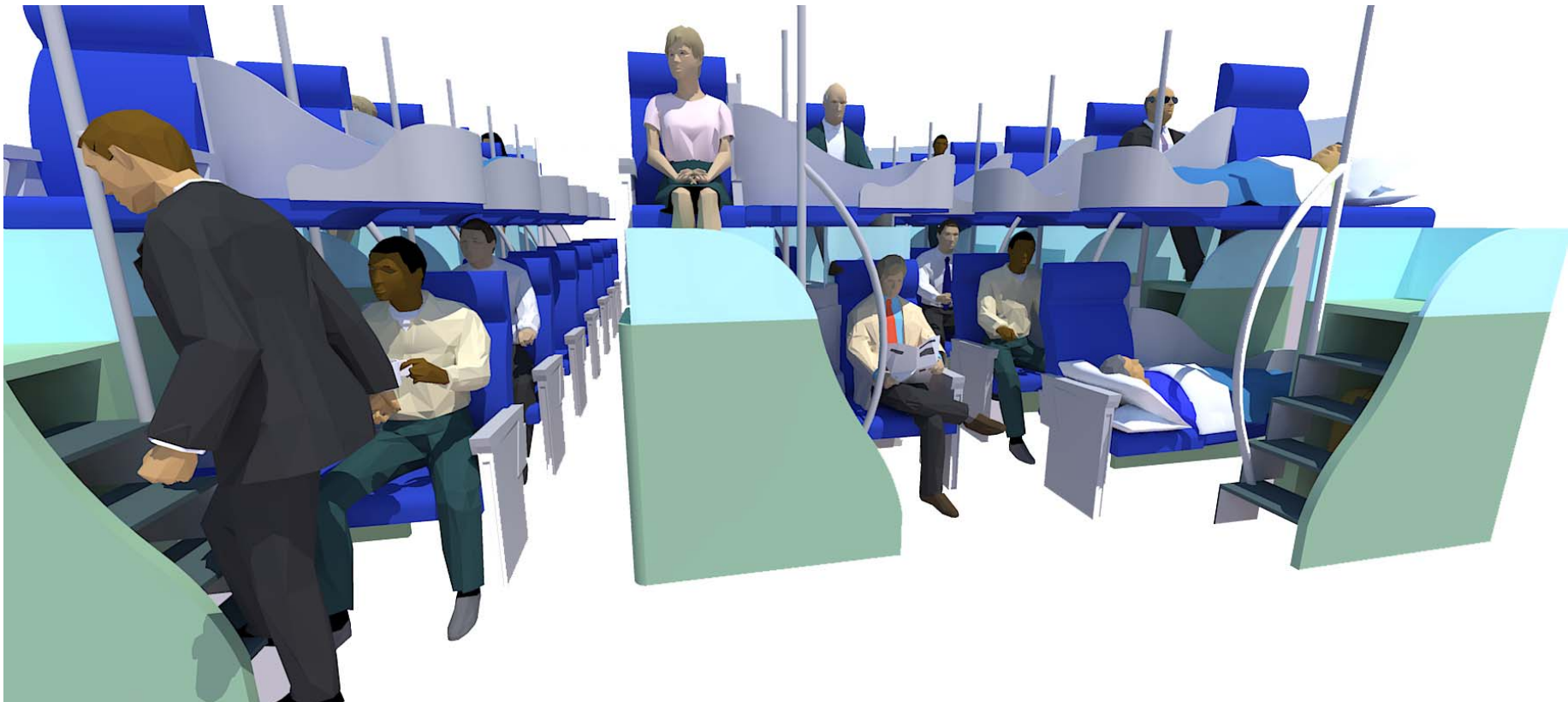


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## Sleeper Class (5-StepSeat)

### Sleeper Class: new class with affordable sleeping accommodations

- Surface cost & length of each bed is the equivalent of three economy seats
- Stair lifts to allow luggage space

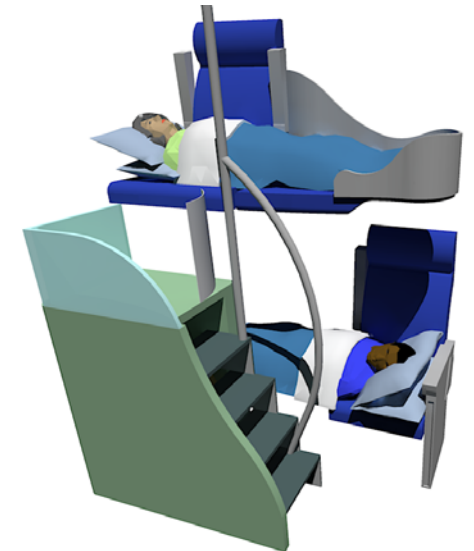




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## Sleeper Class (5-StepSeat)

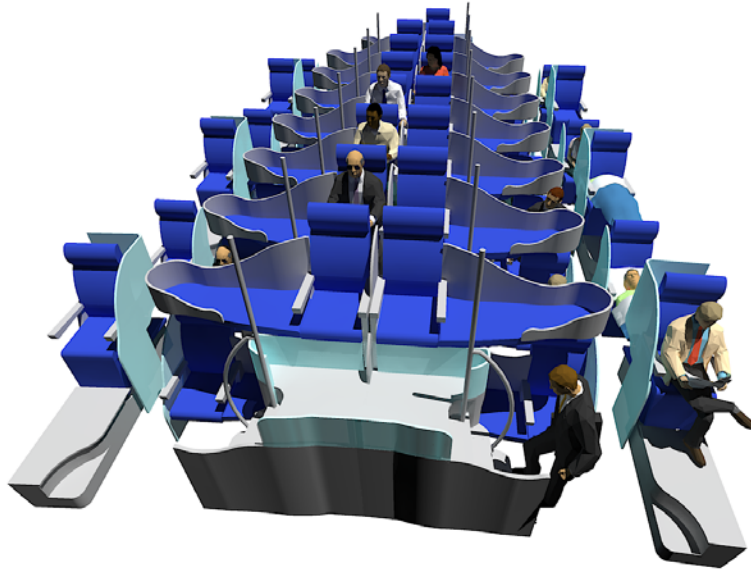
- Each passenger has a dedicated private space
- No need to disturb adjacent passenger when reclined to enter and exit the seat





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## Variations of designs capturing vertical space through steps



Combining **5-StepSeat** with **2-StepSeat** for the windows area

- + More visual openness
- + Longer beds
- Greater surface cost



Sleeper Class  
**5-StepSeat**



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## Variations of designs capturing vertical space through steps

Combining 3-StepSeat with the 2-StepSeat for interiors with limited height such as the upper deck of Boeing 747





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## Sleeper Class (5-StepSeat)

**Certification** - System of connected modules can provide efficient (low weight) structural resistance.

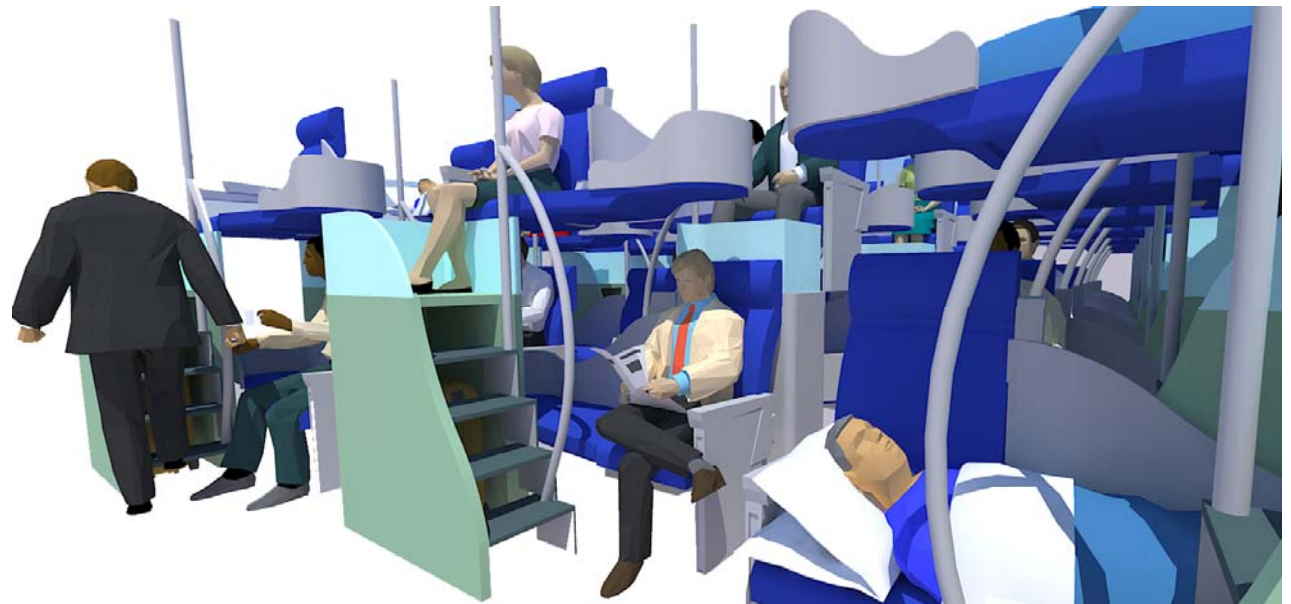
**Fuel costs** from added weight needs to be compared with added revenues from approximately 100% more (comparable) seats.

**Claustrophobia** needs to be weighed against sleep deprivation

**Steps** - compare with similar tripping hazard in steps to seats – e.g. in movie theaters.

- Advanced structural designs materials
- Light weight
- Transparent materials
- Thinner structures
- Ambient lighting

- ✓ Double density
- ✓ Privacy
- ✓ Large luggage
- ✓ Unimpeded access

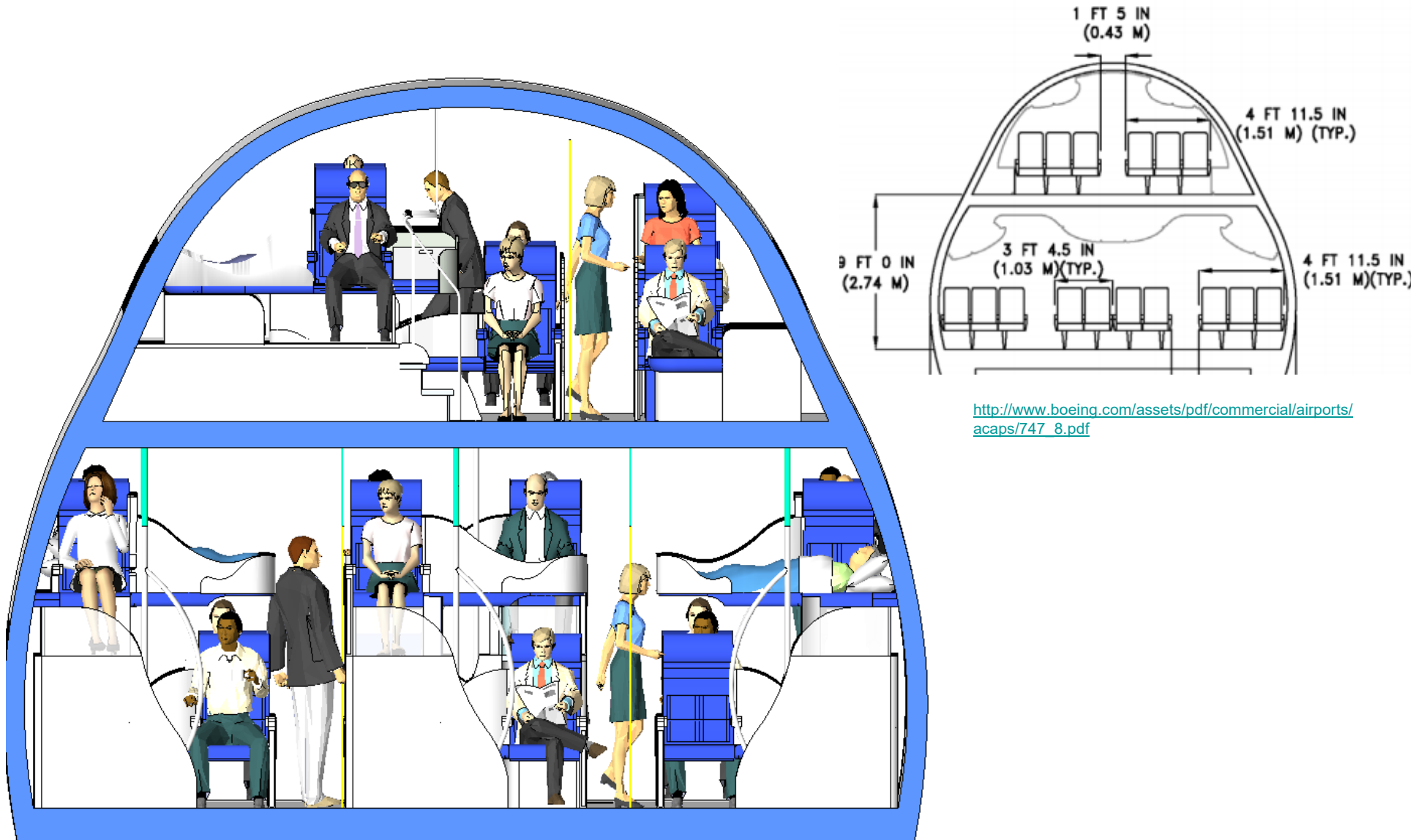




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## Variations of designs capturing vertical space through steps

### Vertical space available in a Boeing 747-8i







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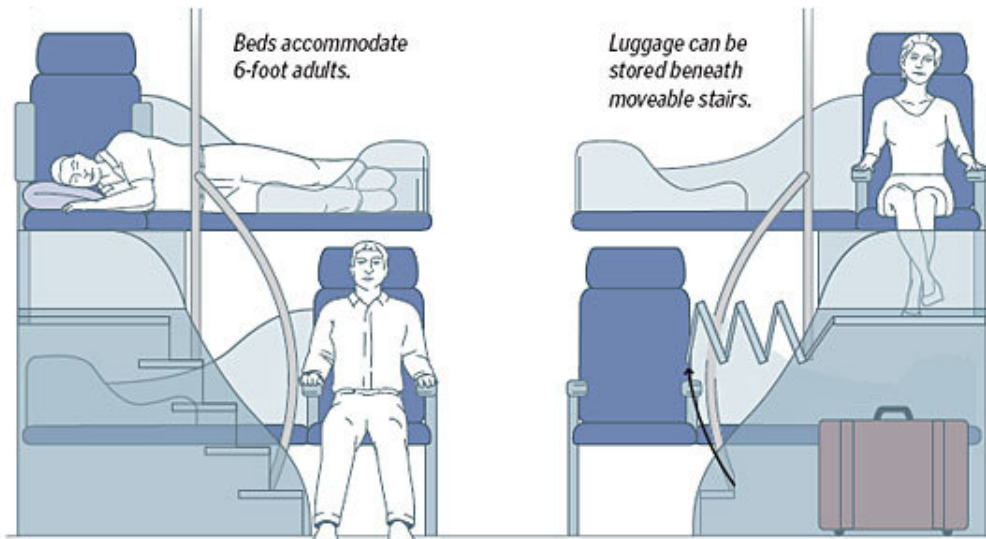
## Articles: StepSeat

# The Boston Globe

HOME / BUSINESS

## Finding room to stretch

A designer says comfort can be found aloft by taking airline seat configurations vertical



(SOURCE: Jacob-Innovations; GRAPHIC: Ed Wiederer / Globe Staff)

A look at the "business flex" design.

By Katie Johnston Chase  
Globe Staff / June 15, 2009

Aircraft  
*interiors*  
INTERNATIONAL

[www.aircraftinteriorsinternational.com](http://www.aircraftinteriorsinternational.com)



# highrise

Pie in the sky or inevitable long-haul product development conclusion? A new generation of tiered seating and sleeping schemes aim to turn headroom into bedroom

BERNARD FITZSIMMONS, AIRCRAFT INTERIORS INTERNATIONAL



Aircraft Interiors International  
SEPTEMBER 2009





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## Articles: StepSeat

DESIGNBRIEF

# what'sup

**BRIEF:** With airlines configuring economy cabins for maximum return, and many operating at the minimum pitches as set out by aviation authorities, there seems to be little opportunity to raise comfort levels for economy travellers. It's time to try a new direction...

**DESCRIPTION:** With the StepSeat Economy, aircraft interiors concept company Jacob Innovations has eschewed the usual lateral thinking, instead creating an economy seating idea that uses the available vertical space to enhance comfort.

The idea is simple and elegant: by mounting alternate seats on 'steps' - basically small platforms the height of a conventional step - legroom is increased and the occupant can



024 Aircraft Interiors International.com  
JUNE 2013

The Economist | World politics | Business & finance | Economics | Science & technology | Culture

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Business travel



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**New ideas for cabin design**  
Nov 10th 2009, 17:31 BY THE ECONOMIST | LONDON

Timekeeper | Like 1 | Tweet



## Traveller

Jacob's business-class model, which creates a second storey of seats has the potential to double the capacity of conventional business-class design and afford more privacy.



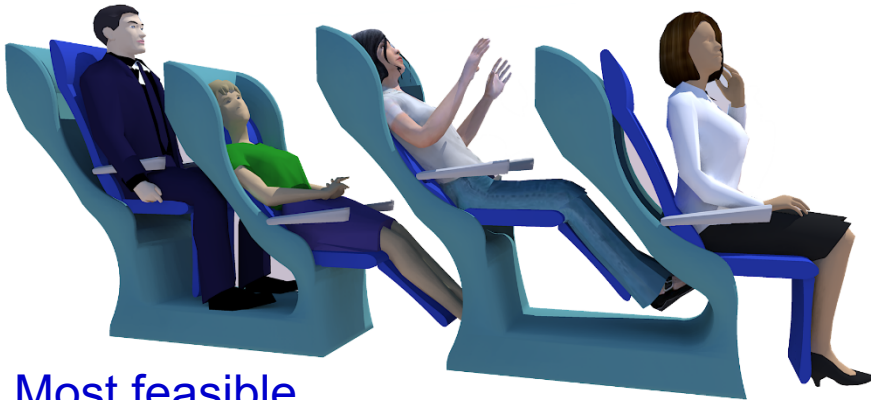
Passengers want more room, airlines want more seats. Kay O'Sullivan finds designs that might satisfy everyone.



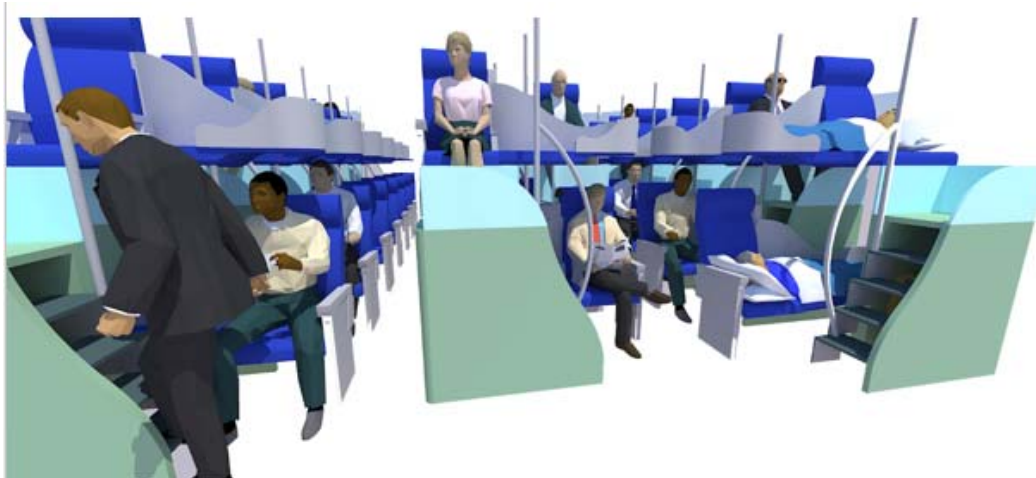
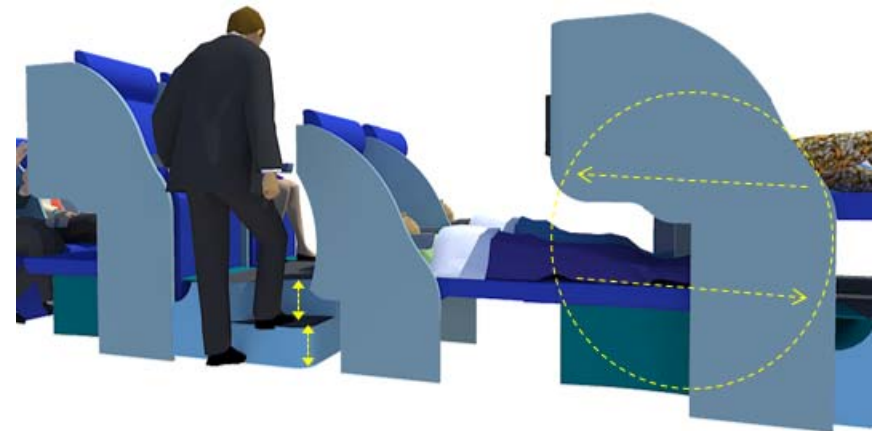
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# Opportunities

Premium Class comfort at Economy  
Class density



Most feasible



- ✓ **Comfort**
- ✓ **Choice**
- ✓ **Privacy**
- ✓ **Density**
  - **Profits**



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# Opportunities

Most feasible, in the short run, is design with least vertical space change  
Premium Class comfort at Economy Class density.

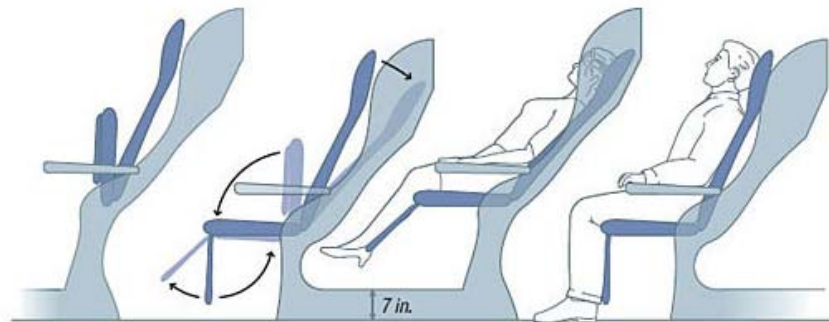
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## New airline seating designs

◀ Prev 2 of 5 Next ▶

### Economy Comfort

Every other row is raised about 7 inches, giving passengers more legroom and more room to recline. Less expensive to build, this design offers about the same number of seats as standard economy seating.



- STORY Finding room to stretch
- TALK What do you think?
- Jacob-Innovations website



◀ Prev

1 2 3 4 5

Next ▶



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# Seating Innovations Via Usage of Vertical Space



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