



## College and University High Speed Rail Competition *Fast Track to the Future*

America is poised to take the most significant step toward transforming its transportation network since the interstate highway system was begun more than 50 years ago. After decades of relatively modest investment in passenger rail, a National Rail Plan for the United States is being developed and, thanks to the American Recovery and Reinvestment Act of 2009, the nation now has a down payment on the implementation of high- and higher-speed rail.

What worldwide and national trends will have the most impact on the development of high speed rail? What kinds of technological breakthroughs can we expect? Will advances in telecommunications hurt or help the development of high speed rail?

Help us gain an insight into one of these key questions and win a chance to attend the 7<sup>th</sup> World Congress on High Speed Rail, **December 7-9, 2010, in Beijing**. The event is organized by the International Association of Railways (UIC) and the Chinese Ministry of Railways.

UIC's National Delegate for the United States is the American Public Transportation Association (APTA), a non-profit organization representing 1,500 public transit systems around the world and numerous businesses that support public transportation. Information on high speed rail in the United States can be found at the APTA Center for High-Speed Rail, at [www.highspeedrailonline.org](http://www.highspeedrailonline.org).



## Guidelines and Competition Rules:

1. All entries must be submitted to APTA by students with proof of registration at colleges or universities contacted by the UIC.
2. Participation to the competition is voluntary and can consist of either essays or artwork (drawings).
3. Essays and artwork submitted may only be the original work of one student or a *maximum* of two students.
4. The student may come from any academic field of study.
5. Each student may only submit one entry.
6. The entry must refer to *only one* of the following:
  - **Subject 1:** High Speed Rail in the Future
  - **Subject 2:** High Speed Rail and Innovation
  - **Subject 3:** High Speed Rail and Telecommunications

These subjects are detailed in Appendices 1, 2 and 3, respectively.

7. Drawings must be accompanied by an explanatory caption of no more than 3 lines. The drawing may be in the form of a comic strip or represent a token of the future. The drawing must be submitted in Adobe PowerPoint format, occupying no more than one slide.
8. Essays must be between 2 and 3 pages long. The essay should be both factual (a series of facts and consequences) and imaginative (about the future in terms of technology and changes in society). It must be submitted in Microsoft Word format, with a 12-point (minimum) Times New Roman font. The essay may be presented as a short story or in the form of a newspaper or scientific magazine article.
9. The entry must be saved using the following file name:  
  
2010 UIC HSR Uni Contest Subject [fill in 1,2 or 3] [college or university name] [student name, last name first, with additional student name for a team of two].  
  
For example:  
  
2010 UIC HSR Uni Contest Subject 2 UVA Jones Allison Smith William
10. The file must be sent to APTA at the following e-mail address:  
highspeedrail@apta.com
11. Deadline: All entries must be received by email by 5:00 p.m. on **July 30, 2010.**

12. Students participating in this competition must authorize UIC to use all or part of their work during the Congress in the form of quotes or displays. UIC, however, pledges to cite the author(s) and the colleges and universities they belong to.
13. The top five students for the United States for each subject area will receive a prize and be entered into the international competition to win paid entry, travel and accommodations to the Congress.
14. Grading will be done in two stages:
  - National Level: The top 5 entries per subject will be selected and sent to UIC's International Jury.
  - UIC's International Jury will grade each document from 0 to 20; entries with the highest grade are ranked in first position and so on; in the case of two entries receiving the same grade, the jury will reach a final decision through a vote.
  - Grading will reflect the relevance of the entry with the subject and originality.
15. Objections will not be accepted in relation to the grading of entries or selection. APTA and UIC have no obligation to justify their decisions.
16. Winners of the competition agree to attend the Congress and participate in the round tables.
17. All students invited to the Congress accept to be involved in an international team coordinated by UIC during the Congress. They must attend the Congress sessions and report back on them. Attendance is compulsory. All students will receive a letter of thanks from UIC, which will also certify their active participation in the Congress.
18. The following must be clearly written on the last page of the entry:
  1. Country
  2. City
  3. College or University name
  4. Student name(s)
  5. Year or level of academic study
  6. Major/main subject of study
  7. The subject of the entry
19. All participating students must sign and date the Entrant Agreement at the end of this document and submit it with the entry.

## Appendix 1, Subject 1:

### *High Speed Rail in the Future*

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#### **1. Background**

The last UIC High Speed World Congress took place in Amsterdam in March 2008. The next Congress is scheduled to take place in Beijing, in December 2010.

- In almost 3 three years, many things have happened in a wide range of areas:
- Politics and world governance
- Economics and finance
- Technology and science
- Health
- Arts
- Communications

We are of course aware of most of these developments, and our predictions for the future are strongly influenced by recent major events. Nonetheless, it is sometimes the less talked about events that cause the deepest changes.

#### **2. How this applies to the transportation sector**

In the transportation sector, the following events are worthy of notice:

- The world financial crisis
- The Copenhagen climate change meeting
- The launching of the 380 Airbus and Boeing Dreamliner
- The shuffling of the automobile sector with difficulties faced by the biggest car manufacturers, the craze for smaller cars and the development of various electric car technologies
- The extremely fast extension of the high speed network worldwide and construction of the biggest rail project in the world between Beijing and Shanghai
- The highest oil prices ever experienced (\$US 140 per barrel in 2008)
- In the United States, unprecedented federal funding for a new system of high speed rail networks

#### **3. Subject for entries**

**Which of the events listed will have the greatest impact on high speed rail?**

**Will this impact be positive or negative for this mode of transportation, and why?**

**Are there other predictable events that have not yet occurred that could deeply change the way high speed rail develops regionally or globally?**

## Appendix 2, Subject 2:

### *High Speed Rail and Innovation*

#### **1. Background**

For thousands of years, combustion was the only way for human beings to make light. But during the 19<sup>th</sup> Century, there was a sudden **breakthrough** that overturned traditional lighting methods. Let us look back at key events in the field of artificial lighting:

- In 1800 Humphry Davy, an English scientist, discovered the electric arc, pointing the way to electric lighting.
- In 1878 Joseph Swan (another English physicist ) succeeded in creating long-lasting electric light.
- In 1879 Thomas Edison, a creative inventor, put a carbon filament into an oxygen-free bulb that glowed for 40 hours, effectively questioning the need for combustion.

This last breakthrough dramatically changed the way human beings regarded light. Many other improvements have been made in electric lighting since the end of the 19<sup>th</sup> century, and these days it is common to see aerial night photos indicating population density by clusters of light. The discovery of lighting without combustion gave people the ability to overcome darkness with the flick of a switch, extending daytime far into the night and thus profoundly changing their lifestyle. And along the way, people forgot all about their past struggles with fire.

But this is not the end of the story. A **second breakthrough** is happening right now, thanks to the struggle against climate change. Incandescent bulbs waste too much energy and are no longer considered a sustainable solution. Fluorescent bulbs, which discharge electricity through ionized gas (plasma), offer long life and high light efficiency while using much less energy. Incandescent bulbs are thus no longer welcome and will be progressively prohibited and replaced.

The lesson to learn from these facts is that once a technology reaches a high level of sophistication (such as the candle, or oil and gas lamps, or halogen lamps) any further progress is extremely difficult. Any marginal improvement is costly either in terms of money or climate. This paves the way for a breakthrough towards new technology and deep behavioural changes.

***The suggested approach for tackling the issue of “High Speed Rail and Innovation” is to use this theory of breakthroughs in evolution.***

#### **2. How this applies to the transportation sector**

Similar breakthroughs can be identified in the evolution of the railway.

- The first trains were freight trains.
- Then passengers were carried by trains running on tracks originally built for freight.
- The 19<sup>th</sup> Century even witnessed mixed trains carrying both freight and passengers. However the requirements for passengers and freight developed in different directions: towards slower and heavier trains for freight; and faster, lighter trains for passengers.
- The difference in speed led to capacity problems that could only be partially solved by running alternating batches of passenger and freight trains on the same tracks. This capacity allocation policy culminated in the almost total dedication of daytime to

passenger trains and the relegation of freight to the night period. So freight and passenger services were separated in time but still running on the same infrastructure.

- With the shift from steam to electric power, the difference between freight and passenger train speeds increased, making it more and more difficult to operate both services on the same tracks.
- When the system of locomotives pulling carriages (inherited from the stage coach) was abandoned and trainsets were adopted, passenger trains could travel much faster and on steeper gradients. This final jump in speed and adherence has led to a divorce between passenger and freight trains and the dedication of new lines to passenger services only.

This pattern of evolution is not exclusive to rail transportation. Similar breakthroughs can also be seen in the history of road and air transportation: switching from rubber wheels to inflatable tires and from propellers to jet engines are just two examples that illustrate this similarity of evolution.

### **3. Subject for entries**

If we apply the story of lighting to the transportation sector, what can we expect in the future? What breakthroughs will result from the struggle against climate change?

We already know that electric cars are in the pipeline. And perhaps aircrafts will see a return to propellers. But what about trains?

*There are two essential subjects we must tackle:*

- **Predicting the future breakthroughs that will affect or enhance each of the three transportation modes**
- **Trying to measure their respective impacts on the other transportation modes.**

Moreover, the faster trains run, the more difficult and costly it becomes to increase their speed. There is probably a level at which wheel-on-rail technique reaches its limit in terms of environmental impact, capital and operating costs, and finally commercial relevance.

What is the residual margin? What could be the next transportation technology?

## Appendix 3, Subject 3:

### *High Speed Rail and Telecommunications*

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#### **1. Background**

A great deal of studies were carried out before any decision was made to build the first high speed lines in Europe—as was probably also the case in Asia—to ensure that rail technology was not outdated.

These studies covered a variety of different fields, from technology, with the aim of significantly increasing commercial speeds, to the market, in order to determine whether construction costs were worth the investment. Traffic forecasters were successful in convincing investors of potential traffic levels that justified their confidence in high speed rail.

However, some experts still questioned rail's capacity to be attractive in the long or very long term. As rail infrastructure was built to last a long time, at least a century, rail had to be viewed with a long-term perspective. Although these experts did not doubt the multimodal econometric model nor believe high speed rail could not compete with the road and aviation sector, they believed that society as a whole was evolving towards favouring telecommunications over transportation.

Indeed, in their opinion teleconferencing and videoconferencing (which were new at the time) would reduce the propensity to travel and gradually replace transportation.

History has turned out differently. The telephone has become a mobile device. Not only do people travel more but they also phone or exchange data with their mobile phones while traveling.

#### **2. How this applies to the transportation sector**

Throughout history, people have endeavored to reach higher speeds, both through means of communication and transportation modes.

In short, means of communication have progressed from face-to-face speaking to discussions over great distances. The increase in distance between the sender and the receiver has gone together with an astounding increase in the speed at which information is carried – it has now reached the speed of light. What started as the exchange of coded signals became the transportation of the voice itself, and at present the bulk of telecommunications consists of data and pictures. To name just a few milestones in this long history: pigeon carrier and pigeon post, telegraph, telegram, telephone, fax, e-mails, webcam, etc.

The transportation sector has seen a similar evolution, both for passengers and goods. From the horse to the wheel and the wheel to the aircraft, progress is everywhere. In this respect it is worth noting the advent of space tourism, launched by Virgin Galactic.

Moreover, new applications are being developed, such as one that enables users to visit places in 3D vision simply by sitting at their computer. Such applications are only an early sign of what can be achieved by combining technologies. One can only imagine how far technology will take people and how many possibilities it will provide them with, be they moving or stationary.

### **3. Subject for entries**

However, there is a major difference between telecommunications and transportation (even rail transportation).

As opposed to transportation, telecommunications require very little energy.

As we face the need to limit climate change, the issue of whether telecommunications can replace transportation has returned to the fore.

**The entry should therefore focus on the respective futures of telecommunications and high speed rail.**

Are they converging or diverging?

Are we more likely to see a greater number of people traveling and using their phones to make calls or share data on trains, or rather, a decrease in the number of people travelling and an increase in the use of telecommunications? Synergy or substitution?

**2010 International Union of Railways (UIC)/Chinese Ministry of Railways/  
American Public Transportation Association (APTA) College and University High-Speed  
Rail Competition:  
“Fast Track to the Future”**

**Entrant Agreement**

1. By submitting an application, I agree to abide by all the conditions below.
2. I certify that I am at least 18 years of age and lawfully able to enter into this agreement.
3. This offer is subject to all federal, state, and local laws and regulations and is null and void wherever prohibited.
4. All references to “the sponsoring organizations” herein shall be deemed to include the American Public Transportation Association, the International Union of Railways, the Chinese Ministry of Railways, and their employees, directors, members, agents, judges, and contractors, whether individually or collectively.
5. I understand that the sponsoring organizations will not be responsible for submissions that are lost, late, or misdirected for any reason.
6. I represent and warrant that my submission is my original work, has not been copied from the work or works of others, and does not violate the rights of any person or entity.
7. I agree to indemnify, defend, and hold harmless the sponsoring organizations against all claims or litigation of any nature arising from or based in my submission, and I agree to release and discharge the sponsoring organizations from all liability in connection with this Competition, including, without limitation, legal claims, costs, injuries, losses or damages, demands, or actions of any kind.
8. I agree that my submission shall become the exclusive property of the sponsoring organizations and might not be acknowledged or returned in any form. The sponsoring organizations and their assigns may use all or a portion of any submission in any manner and in any and all media now known or developed in the future.
9. I agree that any winner shall be determined by the sponsoring organizations in their sole discretion and that all decisions are final. I agree to waive, to the greatest extent allowable under law, any and all rights I may have to judicial or other recourse in relation to any aspect of this Competition.
10. I agree that, if selected as a winner, I will be solely responsible for any and all taxes payable to any government or authority and that the sponsoring organizations may report my winnings to any appropriate taxing authority.
11. I affirm that the work I am submitting is my own and that I am enrolled as a student in an accredited college or university invited by APTA, UIC’s delegate in the United States for this Competition, to participate in the Competition.
12. If my entry is chosen, I agree to attend the Congress (with travel and lodging expenses paid by UIC, as enumerated in the official Competition guidelines) and participate in the round tables.
13. I agree to participate in an international team coordinated by UIC during the Congress, attend the Congress sessions, and report back on them as requested by the sponsoring organizations.

**Signed:**

Date: \_\_\_\_\_

\_\_\_\_\_  
**Print name(s)**