

## R&D SYMPOSIUM ROUNDTABLE

# JR EAST'S EFFORTS FOR INDUSTRY-ACADEMIA COOPERATION

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I would like to give a summary here of JR East's efforts in industry-academia cooperation. There are two subjects I will introduce here. The first is our policy on industry-academia cooperation. And the second is our current efforts including examples of what kind of cooperation we are carrying out and what kind of results we have been achieving.

### 1 JR East's Policy on Industry-academia Cooperation

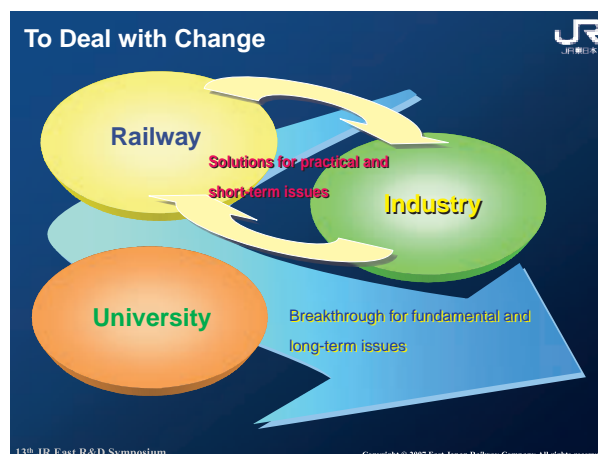
To start with, the change in the R&D environment can be described as the change in the environment affecting the JR East group. Based on the changes in the environment surrounding our railway business and many related businesses, we anticipate three major changes in the future, although we have not thoroughly analyzed all of those changes yet. I feel that changes in the social environment are quite radical and occurring fast, as seen in the declining birthrate and graying of society and unexpectedly serious natural disasters that have occurred recently. There also will be big changes in customer value including pursuit of safe and reliable transport, a sense of security over the future, and enhanced value of time. Furthermore, we recognize that large-capacity high-speed communication technology, new materials, and other big changes in the form of technical innovation

will emerge around us as the measures to address those.

To meet such changes and bring about breakthroughs, more and more long-term and fundamental research will be important. Specific themes that will be important are shown in the figure below.

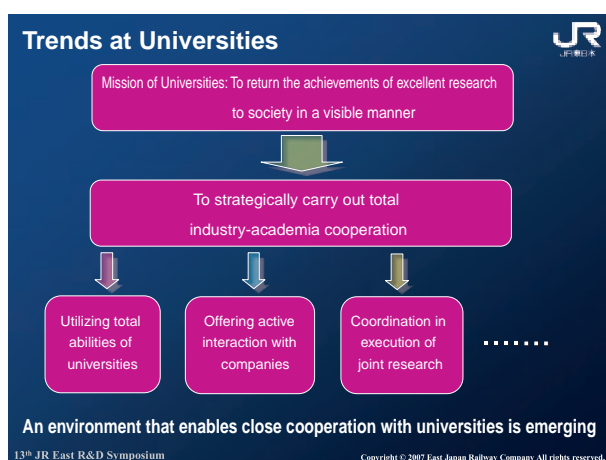


In this context, we have been proceeding with developments on realistic issues and issues that should be solved in a short time while receiving sufficient cooperation from industry, and we believe that the coordination with industry in realistic technical fields should remain at the core. However, it is the fundamental and long-term



issues that we believe will bring about breakthroughs through further coordination with universities.

As referred in the keynote speech before, I feel that universities have been undergoing major changes recently. Specifically, universities realize their mission to return the results of their excellent research to society in a visible manner and try to strategically carry out university-wide industry-academia cooperation. We are aware that universities are utilizing their total abilities, offering opportunities for active interaction to companies and forming organizations to coordinate joint research. Thus, we recognize that there is an emerging environment that enables us to actually have close cooperation with universities.



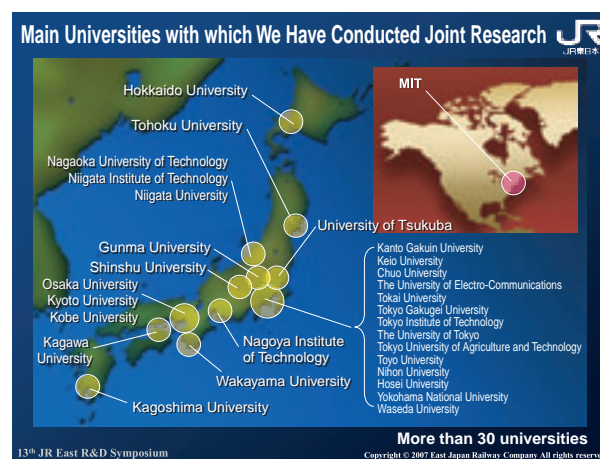
We have high expectations for two of the many practical styles of industry-academia cooperation. One is technical seeds of universities that can solve our issues; and the other is the approach to combined and cross-disciplinary issues by a university as a whole, rather than by a single department or a laboratory. In the future of a complex society and dramatic environmental changes, we may find the solution only when we take such an approach to or way of understanding the issues.



## 2 Examples of Industry-Academia Cooperation at JR East

JR East will see the 20th anniversary since its foundation in this April. We have proceeded with industry-academia cooperation under the leadership of our top management since just after that foundation. Here I will introduce some examples of that cooperation.

We bring our most specific corporate needs and seeds of universities together for research—this is so called joint or contract research. We have been proceeding with that with more than 30 universities. Some joint research has been going on for a long time, but most has been for just the past several years to tackle challenges of the day. Because of our location, much of our relationships in Japan have been with universities in the greater Tokyo area. Still, we are proceeding with joint research with a wide range of universities from Hokkaido in the north and to Kyushu in the south. We also have long and close relationship with MIT in USA, although that has been the only instance of such a relationship abroad.

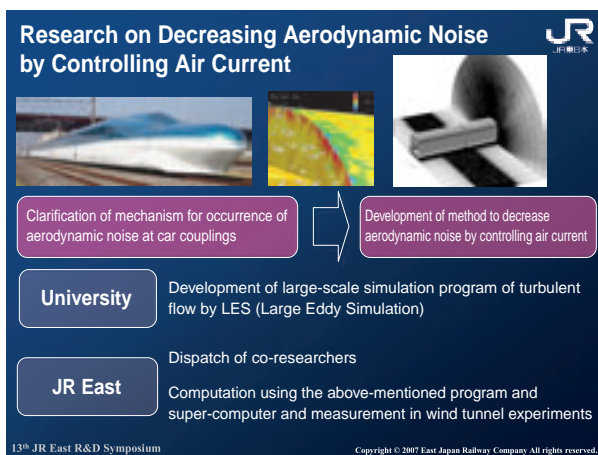


The themes of joint research are chosen according to our corporate strategy, improvement of safety and reliability, improvement of convenience and comfort, reduction in costs, contribution to the global environment, and development of new services in station space. We are aiming at achieving specific results in these researches.

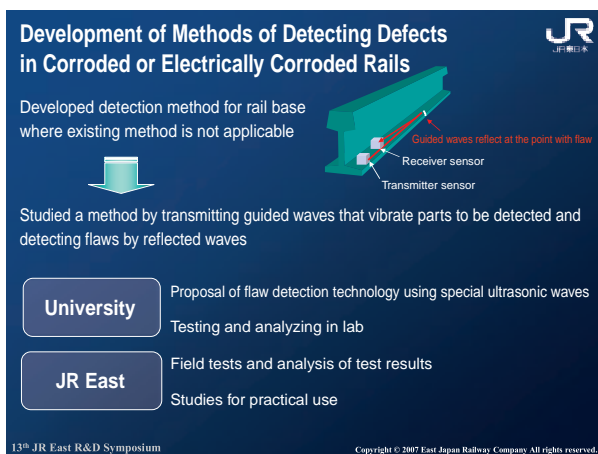


# Interpretive article

Now I will introduce two specific examples. We are now dedicating major effort to R&D to increase shinkansen speeds. This might not be a matter in hand, rather a challenge for the future; but we are seeking further solutions to aerodynamic noise caused by fast-running railway cars. Regarding this issue, we are now focusing on couplings between cars and trying to decrease the noise as much as possible by covering and flattening the couplings. We are also studying a way to prevent such noise by controlling air currents at the couplings. A university has provided us with technologies including a large-scale simulation program of turbulent flow, and we have been dispatching our staff to the university to carry out wind tunnel experiments and other efforts using a supercomputer for this study.

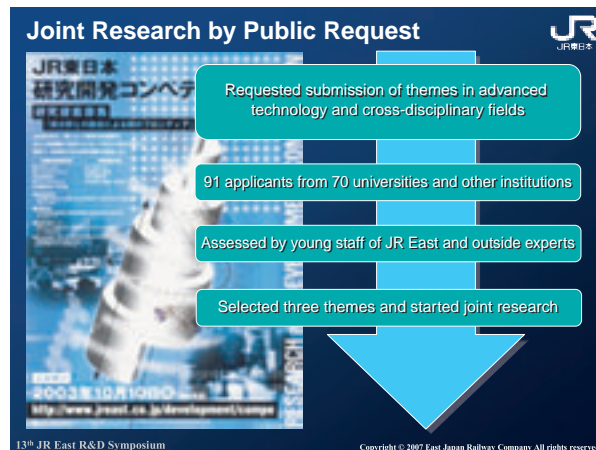


The next example might sound very steady. Rails, the most basic components of a railway, are one piece of infrastructure important to ensuring safety. In daily inspections of rails, we can check principal parts of a rail using an automated method of defect detection, but this method is not applicable to bases. So, we are studying a defect detection method by a new sensing technology using low frequency ultrasonic waves, "guided waves".

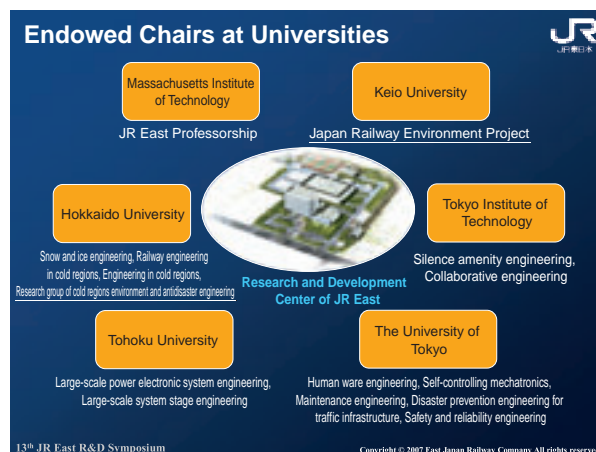


The following figure shows one of our trials several years before. When we tried to find partners and themes for joint research by making a public request, we received more than 90 applicants from

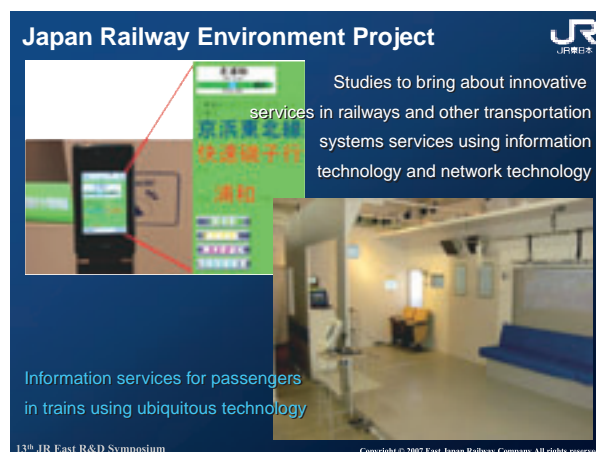
70 universities. Although we finally had to narrow this down, some of the results of that joint research are now coming into fruition. This is an instance of our attempts using that methodology.



Next I will introduce our endowed chairs. We started endowed chairs just after the formation of JR East. To date, we have set up such chairs in six universities covering many themes.

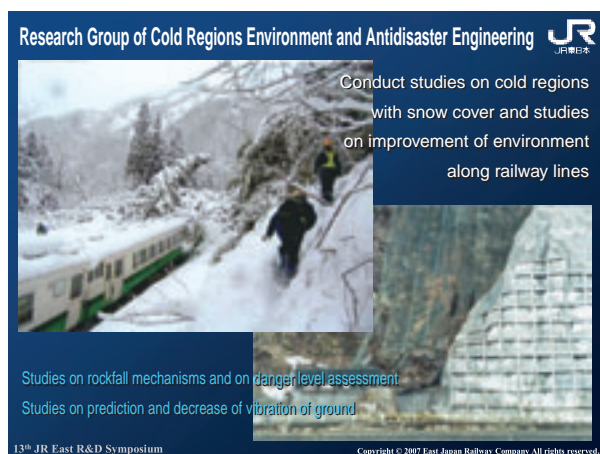


For example, we conduct a collaborative project with Keio University Shonan Fujisawa Campus, titled "Japan Railway Environment Project". In this project, we study services about transportation systems.

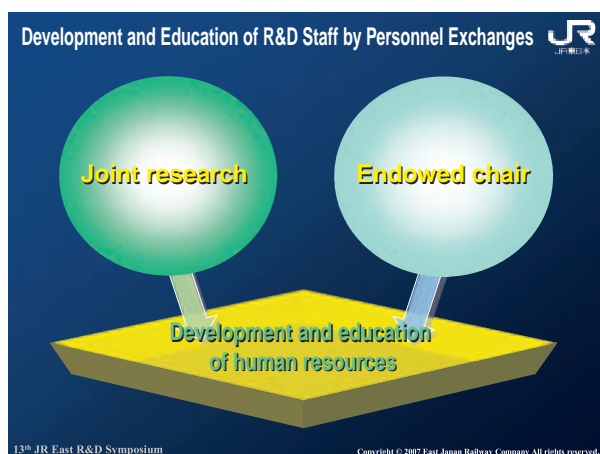




We also have an endowed chair at Hokkaido University. As the chair is tackling the issue of disaster prevention in cold regions—an area where this university has a big advantage—this research has been continuing for quite a long time.



We consider joint research and endowed chairs to be more than simply sources of results. Instead, we dispatch staff to universities whenever possible so we can work on issues together. More than 80 persons among our technical staff so far have such experiences. The number is still not enough of course, but this style of cooperation has contributed to building the foundations of our technical and research human resources, and we plan to go even further with it. We would also like to try a different style where we invite people from universities to our R&D departments and to carry out joint research.



### 3 Future Perspective

We have high expectations for the technical seeds that universities already have or that we can create together to help solve the many issues we face. For the future, we have particular expectations for the approach by universities as a whole to combined and cross-disciplinary issues, and we would like to carry out research to find fundamental solutions to various issues. And aiming to strengthen our R&D foundations, we are planning to more actively carry out personnel exchanges.

