goals, methods, approach, costs, timeline, expected results, modes of implementation, etc. The project will conclude only when it is implemented fully and satisfactorily in the premises of the beneficiary. Half of the estimated cost is to be provided by the industrial partner and the other half from the Government. Some of the Government share may go towards equipment, since the industry is normally reluctant to contribute to permanent equipment. The industry is given 100% tax exemption for the funds provided to the academia. This route puts onus on the faculty to identify a problem of great importance to the industry end-user who is willing to pay, and onus on the industry to seek a faculty member equipped and willing to solve their problems of importance. This process will ensure closer interaction between academia and industry than existing now, which will result in mutual respect and a sense of partnership. When the originator or the beneficiary is a small-scale industry or a societal body, the Government may bear more than half of the project cost, including all of it. Even in this case, identification of the problem and the beneficiary is critical.

This approach will generate innovative, implementable solutions to our problems, whether industrial or societal. The industry will move away from its past tendency to import foreign technology or pursue reverse engineering, etc. The project will conclude only when it is fully implemented to the satisfaction of the beneficiary and has delivered the promised results or more. Papers and patents are only secondary outputs in this case.

Is this just a kite-flying exercise, or can it work in the Indian scenario? It is true that this is not an easy path, primarily because academia and industry are driven by different goals – for academia, it is publish or perish, and for industry, it is a quick, cost-effective, guaranteed solution. The government can help in bringing them together through a tax break and cost-sharing. Can it happen in the Indian context, or has it ever happened? The Institute of Chemical Technology, Mumbai, which is now a Deemed University, earns a sizable portion of its expenses from the industry[4]. Some of the CSIR laboratories (e.g. National Chemical Laboratory) earn a respectable sum from the industry. Another successful example is the public–private partnership, i.e. 'New Millennium Indian Technology Leadership' initiative, started by CSIR. Tata Research Development and Design Centre, Pune, set up in 1981 with a mission of 'using existing knowledge for the benefit of our industry and our people' (in the words of J. R. D. Tata), earns much of its expenses from the beneficiary industry by providing cost-effective, time-bound, implementable solutions with guaranteed benefits of improved productivity, lower energy consumption and improved quality with the existing equipment and personnel[5]. The research team and the beneficiary become partners, and not giver and recipient.

The present-day problems are complex and require multi-disciplinary teams of scientists, engineers and even designers to work together with shop-floor personnel. Such multi-disciplinary teams can best be assembled only in our leading academic institutions.

In summary, some geniuses in our leading educational institutions should be identified and supported handsomely for 5-year terms for blue sky, open-ended fundamental research. Secondly, a major effort should be made by bright faculty in IISc, IITs, etc. to tackle important societal and industrial problems in a time-bound manner, with the end goal of successful implementation in the premises of the beneficiary leading to clear benefits. This activity should be funded (half) by industry or the beneficiary who is given 100% tax rebate, and by the Government matching the industry support. This will bring about academia–industry partnership for national good and for enabling India to take its rightful place among the top economic powers.

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# Knowledge dissemination in earth system science in India

This letter discusses the advances in knowledge dissemination techniques in the country in earth system science with techniques to improve the national advisories. A new scheme is suggested here for maximal utilization of the country's resources and for disaster management in the light of the new policies incorporated by the Central Government – the Digital India and National Knowledge Network (NKN) scheme.

The Earth System Science Organization (ESSO), New Delhi, operates as an executive arm of the Ministry of Earth Sciences (MoES), Government of India for its policies and programmes. The primary aim of ESSO is to develop and improve the capability to forecast weather, climate and hazard-related phenomena for social, economic and environmental benefits, which include climate services. The aim is to provide the nation with the best possible services in forecasting monsoon and other weather/climate parameters, including early warnings of natural disasters like storm surge, earth-quakes, tsunamis and other phenomena through well-integrated programmes. Knowledge dissemination methods of ESSO-MOES should mainly target three goals and fall into three tiers based on a descending order of importance:

(1) Tier 1 – Saving lives: This is the primary responsibility of any government and it has been done in a systematic manner by various public and private groups. This includes evacuation of the people and resettlement, as has been done all round the world from ancient times.

(2) Tier 2 – Saving the basic needs of the people: We have been placing instruments to record the natural parameters for prediction of tides, storm surges, etc. In recent times, ESSOs like NIOT, INCOIS, etc. have placed oceanographic buoys and meteorological instruments to capture the weather variabilities and for weather prediction. They also run numerical models for the prediction of ocean and atmosphere – NOWCAST and FORECAST. The primary knowledge dissemination mode is the organization website, it also provides these services through other modes like e-mail, mobile phones, television, radio and electronic display boards to the public in their particular areas of interest. This helps the people prepare for the event/calamity in a timely fashion and save their basic needs efficiently.

(3) Tier 3 – Protecting the way of life of the people: As a part of the present Government's plans and policies, we can now devise better methods to not let the potential disaster affect the average lifestyle of the people in the area.

In the Digital India programme. The following need to be implemented as part of the tier 3 scheme.

The creation of digital infrastructure: To a large extent this has already been in place at ESSOs-MOES like INCOIS, NIOT, ICMAM, etc. where the NOWCAST and FORECAST models have been developed and researched upon. These include the setting up of the atmospheric and weather models as well as running the various general ocean circulation models. There is in fact a high performance supercomputer operating these models at IITM, Pune.

Delivering services digitally: In order to meet this objective, we suggest that the digital modelling system developed by the ESSOs be further expanded and connected to the various universities designed under the NKN scheme. In this manner, all local universities which come under the NKN scheme in disaster-prone/designated areas should be connected electronically to the ESSO centres and have a section with expertise in earth system science models. There should be personnel capable of routinely analyzing the electronic data from NOWCAST and FORECAST, transferred through the network. In the long run, these personnel should be capable of running the models, and generating and interpreting the output.

Digital literacy: The universities with the modelled data and expertise in earth science should be involved in teaching and disseminating basic information about the forecast to the local students. This would create public awareness about environmental health.

Thus an efficient implementation of these knowledge dissemination schemes would go a long way in reducing the difficulties faced by the people in the disaster-prone areas.

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# Contemporary teaching and research

We contradict Chaudhuri's[1] comparison of contemporary teachers with those who taught 25 years ago. This is because the present-day academic environment is much more competitive and demanding, and in many ways different from what prevailed several years ago. What would seem correct in the past might not always be appropriate and possible in the prevailing times. Research for the award of Ph D degree requires the fulfilment of several criteria and formalities in the present times. Thus present-day students undergo continuous evaluation and are under continuous pressure. The current situations require an academician to be a good manager and teacher at the same time. Hence, we opine that 'teacher-managers' are the need of the hour.

On the contrary, we consider that the new-generation teachers are more up-to-date with new research ideas and ways to motivate students with innovative thoughts. This is because they themselves have been students of the contemporary times and hence are more aware of the problems of the present era. The earlier generation of teachers who have been in the profession for around 25 years, tend to stick to conventional thoughts and are often reluctant to accept modern means of research and teaching. These senior academicians usually stick to old conventional methods which have been mostly adopted from the West and tend to continuously apply them. In fact, under many circumstances it has been found that they are completely against the inception of new methods of research and this in turn leads to the academic under-development of research scholars. The contemporary generation is thus obstructed from incorporating innovation and exercising creativity.

However, we agree with Chaudhuri[1] that the level of classroom education has been much compromised in the present times, and would like to point out that this is the combined impact of the continuous evaluation system and administrative responsibilities of faculty. Due to the former, frequent exams are held and students mostly emphasize on getting through rather than learning. In addition, the administrative responsibilities and formalities that teachers are bound to fulfil mostly make them incapable of devoting adequate time for teaching and supervising research scholars. The consequence is that students end up taking more exams than classes, and thus research work is delayed and hampered. This problem is more evident in case of senior faculty who have been teaching for about 25 years, as these usually land up in higher administrative posts. In these cases, administrative and official responsibilities greatly overshadow research and teaching.

We also agree with Chaudhuri[1] that craving for API scores has affected the quality of scientific research. This has led to many unethical means and emergence of a number of publishing houses to which low-quality research is 'sold' for promotional pursuit. It is this quest for material benefit that has led to many college teachers and aspirants to opt for research. The main aim of such 'researchers' is to somehow complete the necessary criteria for the award of the