ON ADVANCEMENT OF YOUNG MATHEMATICIANS RESEARCH

AND A PROPOSAL FOR A MATHEMATICAL RESEARCH INSTITUTE OF NEW TYPE
• Research developments in pure mathematics can be very approximately compared with a large tree.

• There are fundamental primary developments that have already become wide branches of the tree or will become wide branches in due course.

• Secondary (in the long run) developments will never become wide branches or many won’t stay long as living branches.

• Some of the secondary developments may be mistakenly perceived by contemporaries as primary developments.
• Larger numbers of modern researchers work more narrowly.

• This typically means to concentrate and reach a high level of technical expertise in a small area, at the same time having relatively little understanding about what is going on other branches, including primary branches.

• This means losing the overall perspective of the place of one’s research work in the tree of mathematics, and the vision for mathematical developments on the whole.

• Some roots of the decline of support to pioneering fundamental work, such as the shortsighted race to higher number of publications and higher citation index, which often results in pressure to produce short-term work that consists essentially of minor improvements to known results, originate from causes external to the mathematical community, including from bureaucrats at various levels and in different countries.
• Researchers are forced to specialise quite narrowly. This leads to the emphasis on technical perfection as opposite to innovation and on presentation rather than substance of work.

• Following this path eventually makes it more arduous to think in broader terms, to learn new areas or concepts, to study new groundbreaking theories, to develop in new directions.

• Associated issues are lack of inventiveness, fear to look too far away or think out of the box, more widely spread imitation, fear to stand alone in scientific endeavour and the implied need to belong to some group and hence to be too dependent on other people opinions.

• Following this path by many directly harms the future of mathematics.
• Other areas of fundamental science experience somehow similar problems with the support of long-term fundamental research.

• We should apply all our efforts to help to restore genuine interest and enthusiasm, revitalise the mathematical environment to stimulate spectacular mathematical achievements and activities.

• Young mathematicians bear the brunt of this short-sighted race and other related aspects.

• We should start with the young researchers.

• Among them, one of the first target groups can be promising future leaders whom we should help now, at the early stages of their career.
• *EMS and national societies can play the most fundamental role here.*

• One effective solution to address these very fundamental issues is to establish a *new international mathematical institute of new type*, which can inspire, flexibly support, disseminate and promote long-term fundamental work of its fellows.

• The new institute will have the task of carefully and diligently searching for most promising young researchers, select candidates and support and encourage them in several aspects of their work.
• The institute can systematically stimulate work in key directions and on key problems, support intra-disciplinary mathematical research, help to overcome communication between mathematicians, rapidly respond to innovative fundamental theories and proofs by organising groups of mathematicians to study them, as well as conduct high quality public presentations and engagements activities for the general public.

• This new institute will have several administratively autonomous branches based in existing leading mathematical departments or institutes in several countries.

• An important aspect of the institute is that its fellows will be fruitfully influenced by different national mathematical traditions and research climates of different countries. Fellows will be able to move from one branch to another.
• Each branch will be directed by its branch leader who is either known with his/her long-term work on fundamental problems and/or with his/her highly successful work with other researchers to help them achieve fundamental breakthroughs.

• Since the institute structure is not centralised but has several international branches, the institute will have an appropriately small administrative office.

• The institute will have a board that includes its director, its branch leaders and some external people (e.g. prominent representatives of technology and business).

• The board will search for fellows and advertise fellowships, select fellows of the institute, support and encourage fellows during the period of their work, regularly review the outcomes of its work and help to flexibly adjust this work.
• The institute will conduct various activities to encourage work on fundamental problems and improve mathematical climate in relation to this type of work.

• Candidates will be assumed to have already produced substantial contributions of high magnitude and level of insight.

• Candidates will be expected to have already received some acknowledgement, such as mathematical prizes or fellowships or invited talks at top mathematical events.

• To apply, they will be asked to produce reasonably detailed plans/programs of their work on most fundamental problems for a long time, and certain milestones of their work.
• It is not expected that fellows’ research areas are very close to those of the leader of the branch they stay.

• Fellows will feel to be part of the small group of researchers, all of which work long-term on fundamental problems.

• Fellows will be provided mathematical, social, organisational and psychological support.

• The institute will run annual meetings that will be attended by all board members and all fellows, together with invited external participants.

• The institute will also run summer schools for established mathematicians to help them learn modern developments in other areas.