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**FORUM ON
CREATIVITY AND INVENTIONS – A BETTER FUTURE FOR
HUMANITY IN THE 21ST CENTURY**

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INVENTIONS AND INNOVATIONS: KEY ELEMENTS IN STRIVE FOR
COMPETITIVE ADVANTAGES
CONDITIONS NECESSARY FOR CREATING AN INNOVATION
FRIENDLY ENVIRONMENT

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INTRODUCTION

1. The main theme of our Forum “Creativity and Inventions – A Better Future for Humanity in the 21st Century,” suggests that inventions, innovations and creativity are a guarantee for a better and brighter future for generations to come. Passages from one century to another, from one millennium to another, have encouraged mankind to hope for the better. Creativity, inventions and innovations have been considered as the most important components driving technological and social progress. However, they just don’t happen; they are the result of long and hard work.
2. In times filled with the economic and political upheaval, with increasing competition pressure, the objectives of countries, companies and organizations should be securing and fostering the fastest rate of innovation and creativity. In many cases these will be the key factors that will determine political and business leaders’ decisions.
3. Today companies all over the world are looking for ways to grow fast enough to satisfy their shareholders and to reassure their customers and employees. Many countries also realize that the demand for innovative products is rising and try hard to boost national innovative capacity. There is a pressing need to rethink national resource commitments and policies, in particular in respect of enhancing creativity, invention and innovation, and entrepreneurial spirit.
4. To describe the 21st century today, everybody speaks of inventions and innovation, the information society, the knowledge age, the power of intellectual property, etc.; these will become reality under certain conditions. With this presentation we would like to draw your attention to a number of elements and conditions needed for creating an environment supportive for enabling invention and innovation.

INVENTION

5. An invention can be an activity or a result and we will use the term “result”. An invention can be described as something new, that never existed, or a new solution to an existing problem.
6. Creating or developing inventions requires imagination, analytical qualities, information and the courage to break out of traditional schemes of thought and habitual ways of accomplishing tasks.
7. Inventions are the result of human curiosity and creativity. Inventions are created or developed by individuals or by teams of individuals.
8. Most inventions are related to incremental development of technology, a few will be pioneering inventions or breakthrough inventions. Usually inventions represent technological solutions, but today an increasing number of inventions are made (and registered) in fields quite distant from technology, such as genetic research, business solutions, Internet applications, etc.
9. In general, breakthrough inventions (or pioneering inventions) need a lot of incremental improvements (most of which can also be patentable inventions) to become useable products and technology.

10. Technology and inventions, as a fundamental part of it, are, by nature, both private goods in creation and public goods in productive use or consumption. They are private goods insofar as their creation consumes both mental and physical resources of inventors and researchers, which are thereby diverted from other production or consumption activities. Once technology or inventions become available in the form of information, however, they lose their characteristics as private goods.

11. These characteristics of technology and invention create a dilemma. If all are free to use technology and inventions, which have been created, who will be willing to bear the costs associated with their creation? One of the basic rationales of the patent system is to provide such an incentive for the creation of new technology and inventions. It does this by offering to inventors exclusive rights to commercially exploit patented inventions for a limited time in return for the disclosure of the inventions to the public.

INNOVATION

12. Innovation is the process of bringing an invention to the users, to the marketplace, to industrial application.

13. Innovation is planned; it doesn't just happen. Therefore, an innovation vision and strategy is essential. An innovation strategy includes effective analytical tools, a realistic view of opportunities, contingency plans and playing up to your strengths.

14. While invention depends very much on the individual and his/her creative mind, innovation is a process that requires teamwork, excellent cooperation of many different professionals - inventors, technologists, process and product engineers, designers, marketing specialists, lawyers, financial specialists, sales and distribution specialists, etc., not to forget a very important category - entrepreneurs.

15. An entrepreneur is the play-maker who will realize the business potential (market potential) of an invention and bring together all those involved in the innovation process with the objective of generating benefits from the use of an invention - be it a new product, an innovative process or technology or a more economical production method, etc.

16. The success of an innovation will depend, to a large extent, on how much of a competitive advantage it may create, compared to existing products of technologies or processes, used and commercialized by competitors.

17. Innovation will develop and flourish in an economic and social environment open to change and progress. Public policy and the resulting general attitude of society towards risk, failure, science and innovation can strongly influence businesses' ability to develop or implement their strategies. This is particularly crucial for small companies with less managerial and financial resources to help them go against the stream.

18. Hereafter, we will discuss briefly the most important conditions or factors that characterize an innovation-friendly and supportive environment.

EDUCATION

19. Both the general education level of the population as well as special (scientific, professional) education and vocational training, are important conditions for an innovation supportive environment.
20. For public policy makers, the challenge is to overhaul education systems that still tend to place excessive stress on academic knowledge and compartmentalized courses that do not help to convey the idea of innovation and do not nurture entrepreneurship.
21. Change does not necessarily imply more public money in education. Most schools and universities suffer more from a lack of flexibility within their own structures, which prevents them from adjusting and reformulating their programs. They also suffer from the lack of dialogue with, or understanding of, industry and the path of progress.
22. To change this, we need to start to regard universities and schools as an integrated part of innovation.
23. Often access to the “talent pool” has become one of the first motives for companies to transfer innovation assets offshore and, for that reason, if governments wish to attract foreign investment, they must encourage the development of the “talent pool” in their respective countries.
24. The culture of innovative companies must be based on accelerated and continuous learning and be committed to continuous innovation. This requires creative spirits, risk takers who love adventure and are not afraid of making mistakes and innovators who love challenges and visionaries who will turn their dreams into realities. Under the current education systems in many countries, they are not that easy to find.

INFORMATION

25. The free flow of information is extremely important for invention and innovation. Information on the needs and expectations of consumers and users are essential for the success of an innovation. Information is the basis for planning of the innovation process.
26. Information on activities of competitor so other R&D teams can be very useful in developing inventions and for the outcome of the innovation process. Patent documents contain important technological, legal and business information that can be very useful for the product development and commercialization stage.

RECOGNITION AND REWARDS

27. Public and private recognition and rewards play a very important role in the invention and innovation process. Any inventor or researcher expects that his/her work will receive recognition (moral and emotional satisfaction) and will be rewarded materially.
28. One thing is clear – there should exist a fair balance between moral and material rewards offered to inventive and creative people, otherwise there is high risk that they will

loose interest to apply and develop their innovative and creative potential for the benefit of the company or society.

29. Recognition and rewards at the national level are very important to create a positive image of inventors and researchers. Furthermore, it contributes to establishing role models that the younger generation needs to follow and replicate.

30. Experiences show that companies, which have created and apply special reward schemes for inventive and creative collaborators, are not only among the most competitive in their specific field of technology, but also very attractive as employers.

GOVERNMENT POLICIES, INCLUDING TAX POLICIES, SUPPORTIVE OF INNOVATION

31. Governments can play an important role in improving the way the innovation process works. To start with, many excellent scientific ideas are never turned into commercially viable products because scientists or inventors do not always have the necessary commercial and management skills, nor do they understand the needs of consumers.

32. Public policies can also affect development costs, the time needed to bring a product to the market, regulatory uncertainties, the choice of technologies and consumer confidence.

33. A further challenge for public policy-makers is to define a competition policy with the right balance between competitive intensity - fundamental to stimulating innovation - and the recognition that collaboration between companies also needs to be encouraged.

34. National competition laws should allow companies to carry out R&D via joint ventures or large international partnerships, in order to achieve critical mass. This is particularly important for SMEs.

SUPPORTIVE LEGAL AND REGULATORY FRAMEWORK

35. It is no secret that in many countries tax environment and regulatory framework as a whole are not particularly beneficial to innovation. For example, EU Member States have adopted very different approaches to company taxation that affect innovation. For example, there exists a wide range of risk - capital tax systems, making for complex and costly legal procedures, which obstruct transnational investments. Tax systems also tend to favor debt financing to the detriment of long - term financing which leads to under-capitalization of SMEs and weaken their capacity to engage in innovative projects.

36. The effect of regulatory processes on cost and time necessary to bring a new product to the market has also a strong influence on the innovation process. Regulation is not bad per se. The problem facing many innovative companies today is not high standards but inefficient, litigious and time - consuming regulatory processes. For example, according to UNICE, in many European countries, charges for necessary paperwork have risen dramatically over the last 20 years.

37. Public policy-makers need to streamline regulatory processes and make them more flexible and pro - innovative. There should also be more transparency and predictability. For this, it is essential for public officials and legislators to learn about the innovation process and

new and emerging technologies, so as to be able to understand the basic characteristics of new sectors that need to be regulated.

38. For public policy-makers, the challenge is to facilitate rather than regulate, and to protect in order to give companies the greatest freedom to experiment.

39. The role of public policies in promoting a positive attitude towards science and technology is crucial. In order to sustain a continuous flow of innovation, it is essential to have an adequate social consensus in favor of new technologies and the mutations that they imply. Besides, sophisticated and demanding local customers can be considered a key competitive advantage.

40. Special attention should be given towards the creation of a legal or regulatory framework guaranteeing the rights of inventors and other creators to a fair share of the benefits that their invention/innovation has generated for the company or society. Such a framework is, in particular, important for the employed inventors and innovators.

EFFICIENT INTELLECTUAL PROPERTY SYSTEM

41. As the economy shifts from a product-based system to a knowledge-based one, managers need ways to manage their investments in intangible assets that drive innovation. But keeping intellectual property secure in this era of the Internet, with high staff mobility, and open communication, has become very difficult. Companies need a new vision to become aware of the profits they could make from granting licenses or of the technological information and technology-watch potential stored in patent-officedatabases.

42. Companies must identify, assess, manage and exploit their intangible assets across the whole enterprise.

43. Irrespective of the various criticisms expressed, the intellectual property system is still the best means to protect IPRs. It offers a legal security to inventors and investors.

44. A recent study by Merrill Lynch & Co. shows that patenting activity in recent years is higher than any time before over the last century. In 1998, the USPTO granted over 600 patents per one million US citizens, which is higher than the average figure of the 1990s, 450 patents per one million. According to historical data the highest rate of patents granted for the 20th century was in 1916 – 500 patents per one million US citizens.

45. For public policy-makers, the challenge is to overhaul a clumsy administrative system which currently hinders the diffusion of ideas (through joint ventures, technology transfers and licensing) by failing to provide the conditions necessary for efficient enforcement of IPRs, or because the cost and duration of court proceedings in the event of a dispute are very high.

46. Today considerable efforts are employed, both at the national level as internationally, to widen the scope of IP protection – on the one hand to include new, high tech areas (such as genetic engineering, internet based inventions, etc.) and on the other – to offer protection for IPRs related to traditional knowledge and folklore. Also the IP protection system has become wider known and accessible for people in developing countries.

WORKFORCE AND LABOUR ENVIRONMENT

47. Excessive rigidity in many national social and institutional structures constitutes a major obstacle to people wishing to combine entrepreneurship with other activities. This situation makes it difficult, if not impossible, for example, for a university teacher simultaneously to become an entrepreneur in the EU, whereas this is virtually routine for certain types of teachers in the USA. Stronger co-operation between universities and businesses should be encouraged to support the innovation process.

48. Among the arrangements that could be considered are equity investments in spin-off companies and ways of involving academic and research staff both in existing companies operating in their field of expertise, and in spin-off companies. The rigid division between the business world and other spheres, for example the academic sector, creates a barrier in the diffusion of ideas and obstructs the vital flow of technology transfer between universities and businesses.

49. Rapid implementation of innovations may result, in the short term, in job losses for certain types of qualifications, which become obsolete or in the rapid need for specific skills. At the company or policy level, short-term, part-time, temporary employment, sabbaticals, employee training and requalification schemes or the combination of various activities (e.g. industry/academics) are to be better accommodated.

ADEQUATE INDUSTRIAL, TECHNOLOGICAL AND R&D INFRASTRUCTURE

50. Research and innovation can be costly. For that reason many SMEs do not engage in active R&D work, but rely on ad-hoc or occasional innovations. On the other hand innovative entrepreneurs, inventors and start-up companies often need technological, design or other R&D based expertise to develop their inventions into marketable innovations. The majority of them would need expert services, R&D services related to the product or innovation development, which constitute part of the R&D infrastructure.

51. To build the critical mass, both in terms of financial and human means, necessary to develop new technologies or establish new industry standards, companies need to involve everyone in their extended enterprise - employees, suppliers, partners, customers, and even competitors - in the innovation process. Strategic alliances and partnerships are a way to achieve this.

COMPANY CLIMATE AND CULTURE OPEN FOR INNOVATION

52. As scientists, researchers or inventors do not always understand the consumer's need, some excellent scientific ideas are never turned into commercial successes. To avoid it, innovative companies encourage its staff to expand their creativity and innovation thinking from research to the delivery of the new products in the hands of customers. This requires corporate culture and management systems that align corporate strategy, business processes, resources, organization and learning across the enterprise. Above all, innovative companies are flexible learning organizations with a culture committed to continuous innovation.

53. The culture of innovative companies must be based on accelerated and continuous learning and be committed to continuous innovation. This requires a creative spirit, risk takers who love adventure and who are not afraid of making mistakes, innovators who love challenges and visionaries who will turn their dreams into realities. In many countries though, under their current education systems, they are not that easy to find.

ENTREPRENEURIAL SPIRIT

54. Private and public sectors must join their efforts in actions aimed at promoting an innovative dynamism, a culture of innovation and an entrepreneurial spirit.

55. In this era of globalization, there is no safe haven where innovation cannot penetrate. These so-called "traditional" industries also base their current successes on continuous innovation. In fact, there are no "low tech" or "traditional" industries-only companies that fail to incorporate new ideas and methods in their products and processes.

56. Companies that fall into that category often do so because they enjoy a monopoly position or protection from the state. Deregulation of industrial sectors obliges these companies to reinvent themselves and develop new products and services.

57. The challenge for public policy-makers is to craft the liberalization process carefully in order to stimulate vigorous local and international competition as quickly as possible, while giving formerly protected companies the opportunity to reinvent themselves. Policy-makers must balance these potential benefits with threats to the "universal" delivery of services.

AVAILABILITY OF FUND AND FINANCIAL RESOURCES FOR INNOVATION AND INNOVATION-BASED START-UPS

58. Financing is the obstacle to innovation most often quoted by inventors, researchers and firms whatever their size, in most countries and in virtually all sectors. The growth of venture capital has been spectacular but predominantly focuses on less risky investments (staff buy outs, development capital, medium- or low-tech sectors).

59. Inside big companies, the "venture capital" approach is sometimes used to fund innovation (so that new ideas are reviewed on their merits, not in competition with the existing portfolio).

60. Public policy-makers need to create an environment that encourages investors to finance early-stage private equity opportunities in innovative projects.

61. One of the major obstacles in obtaining financing for innovative projects in developing countries, but also in many other countries, is the insufficient information available concerning organizations and banks that provide such kinds of funding, but also on the respective conditions. On the other hand many innovative ideas are not framed and presented in the proper, business-like format, to facilitate their consideration by the funding institutions.

62. Also, due considerations should be given to promoting the backup of loans by knowledge-based (i.e. IPRs) instead of physical assets.

63. How R&D and innovation is funded and conducted makes a difference. A high proportion of private funding of R&D activities reinforces the innovative capacity of an economy, by a major role for universities in performing R&D, and by only a modest government role in actually conducting R&D.
64. Innovation and increased competitiveness makes a major contribution to national economies. For that reason governments must focus more on the funding of their R&D activities with a commercial potential and that serves the needs of national development. Publicizing such R&D programs and government funding possibilities should be given wide publicity, in particular among the inventors', R&D and innovators' community.
65. Questions to consider include the role of institutional investment in high-risk projects, and the size of investment directed at R&D and innovation projects. Governments could establish a list of priority projects for most needed inventions and innovations, in view of their contribution to economic growth.
66. National policy can be a significant factor in encouraging investment in innovation and commercialization, and the way R&D is funded and conducted can make an important difference. National innovative capacity is reinforced by a high proportion of private funding of R&D activities, by a major role for universities in performing R&D and, by only a modest government role in actually conducting R&D. Still, policy-makers have a role to play in encouraging private R&D spending.

CONCLUDING REMARKS

67. Inventions can bear fruit and benefits for its creators if inventions go through the innovation process and reach the marketplace. The innovation process may therefore belong and require a lot of expertise and resources.
68. Innovation starts with a dream, and it is the entrepreneur that has the difficult task to convert that dream into an action and into a real product. Innovation is a high-risk undertaking, however we should not fear for learning from failure, since the way to success is paved by lessons of failure. Inventors and innovative companies should be open to embrace continuous and accelerating change.
69. Innovation is not only the answer to the challenges of competitiveness but is also crucial in the social field (e.g. recognition of inventor's achievements and their rights) and the environmental field (sustainable development and environmental protection).
70. All nations have a wealth of creative and inventive people, with a variety of cultures and experience. One of the best ways to spark great new ideas is to give creators and inventors genuine opportunities to develop their ideas. The faster the pace of innovation the greater the rise in productivity, growth and employment. The successful firms of tomorrow will be the far-sighted and responsible enterprises that have created a corporate climate favorable to invention, creativity and innovation.

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