Meeting of the Council at Ministerial Level, 24-25 June 2009

REPORT ON THE STRATEGIC RESPONSE:
FOSTERING INNOVATION FOR SUSTAINABLE GROWTH
1. **Innovation will be one of the keys to emerging from the current crisis, but it risks being hit hard by the downturn**

1. The global economy is in the midst of its deepest and most wide-spread recession for more than 50 years. What began as a financial, then economic crisis is increasingly becoming a social crisis, with unemployment rates estimated to reach more than 10% in the OECD area by the end of 2010. As governments actively take steps to counter the crisis, it is clear that innovation will be one of the keys to emerging from the downturn and putting countries back on a path to sustainable growth, based on steady productivity increases and on a strengthened response to environmental and social challenges.

2. Yet the crisis poses a number of serious risks and challenges to innovation performance, notably through its affect on investment, finance, trade, entrepreneurship and employment. The government responses to the crisis provide a unique opportunity to maximise the impacts of public policy in fostering innovation and steering market actors towards innovation-related investments, and accelerating activities for which barriers may have been too high otherwise. If this opportunity is handled effectively, countries could be reaping the benefits for decades to come. At the same time, governments will need to consider whether their existing policies to foster innovation are still suited to the changing nature of the innovation process. Analysis underway in the OECD Innovation Strategy, to be delivered to Ministers in 2010, will contribute to the development of whole-of-government policy principles suited to this new, post-crisis innovation landscape.

2. **The crisis is affecting innovation and a number of other determinants of long-term growth**

*Investments in innovation are declining in many firms*

3. The available evidence suggests that the crisis has already begun to affect innovation. Historically, business R&D expenditure and patent filings have moved in parallel with GDP, slowing markedly during the economic downturns of the early 1990s and of the early 2000s. Data on trademark filings, that reflect the creation of new goods or services, with or without technological content, shows that the business cycle is affecting a wide range of innovation.

![Figure 1. The impact of the business cycle on innovation](image)

*Figure 1. The impact of the business cycle on innovation*

Business funded R&D, patents (applications to the European Patent Office), trademarks (filed at the US Patent and Trademark Office) and GDP

(Annual growth rate for the total of OECD countries; divided by standard deviation)

Source: OECD, MSTI and Patent database.
4. Evidence for the current crisis confirms these findings. Corporate reports for the fourth quarter of 2008 in many cases already show a decline or slower growth in R&D spending. Forecasts for 2009 confirm the trend. A recent McKinsey survey of almost 500 large businesses world-wide indicated that 34% expect to spend less on a R&D in 2009 while 21% forecast an increase.

5. R&D is declining because it is financed from cash flow (retained earnings), which contracts in downturns. At the same time, as banks, markets and investors have become more risk averse; firms face difficulties in tapping into external sources of funding to support their investments in R&D. Business R&D is also being re-oriented towards short-term, low-risk innovations, while longer term, high risk innovation projects are being cut first. The decline in business R&D risks affecting the stock of knowledge as highly trained researchers and innovators lose their jobs. Small, innovative firms are particularly hard hit because in many cases their primary asset is intangible in nature (e.g. an idea or a patent) and difficult to value, making it hard to borrow against, or sell, to stay afloat.

6. The crisis can, however, magnify the competitive advantage of research-intense firms who seize the opportunity to reinforce market leadership through increased spending on innovation and R&D. Many of today's leading technology firms such as Samsung Electronics, Microsoft or Google strongly increased their R&D expenditures during and after the new economy bust of 2001.

**Figure 2. Investment in venture capital has fallen sharply**

(Venture capital investment in the United States, index: 2005 Q1 = 1)

![Investment in venture capital has fallen sharply](image)

*Source: PricewaterhouseCoopers and National Venture Capital Association*

7. Fading support by the financial system for firms, and especially new entrants, is a major concern in the current context, underscoring the primary importance of fixing the financial system. Growing aversion to risk combined with other factors (such as difficulties for investors to exit) is already drying up many sources of seed and venture capital. The total amount of venture capital investment in the United States started declining at the beginning of 2008, and the fall accelerated at the end of 2008 and beginning of 2009 (Figure 2). Total investment in the 1st quarter of 2009 was down 60% as compared with the 1st quarter of 2008, while 1st sequence investment was down 65%. Venture capitalists are concentrating their efforts on helping firms survive that are already part of their investment portfolio— not on new start-ups. In China, the number of Initial Public Offerings fell substantially at the end of 2008 as did venture capital investment, notably in high technology sectors.
The crisis is affecting entrepreneurship and business dynamism

8. Economic crises are historically times of industrial renewal. Less efficient firms fail while more dynamic ones emerge and expand. Creative destruction is an essential engine of long term efficiency in market economies, and it intensifies in downturns. Available data for many OECD countries point to a sharp increase in bankruptcies and business failures in recent months. New business models and new technologies, particularly those allowing a reduction in cost, often arise in downturns, as was the case with low-cost airlines which grew out of the recession of the early 1990s. Many of today’s leading firms such as Microsoft or Nokia were born or transformed during economic contractions. As dominant players weaken, they open space for new players and innovators.

9. However, economic downturns can have a detrimental effect on the creation of new, innovative businesses when access to financing dries up. The key role of finance in the development of small and medium-sized enterprises (SMEs) is illustrated by Finland (Figure 3) where the peak in financial constraints coincided closely with the deep recession of the early 1990s and a downturn in self-employed. Economic growth suffers doubly in the long term since innovative new firms exert competitive pressure on established firms pushing them to innovate. Barriers to entry are higher during downturns: studies for the United States, for example, show that fewer manufacturing firms enter during recessions, and that these firms are (on average) larger and more efficient than firms created during expansion phases.

10. Small and medium-sized enterprises (SMEs) in most OECD countries are now confronted with a clear downturn in demand for goods and services if not a demand slump, crimping cash flow. And many SMEs are faced with two additional problems: a) increased payment delays on receivables which add - together with an increase in inventories - to an endemic shortage of working capital and a decrease in liquidity and b) an increase in reported defaults, insolvencies and bankruptcies.

Figure 3. Finance is a key obstacle to entrepreneurship

Plummeting international trade is affecting global value chains, an important source of innovation

11. The sharp decline in trade, foreign direct investment and access to international financing, poses a risk to the global supply chains that underpin innovation. These supply chains are critical sources of new knowledge and learning. They provide companies with technical expertise, knowledge of foreign markets, critical business contacts and international partners. The current decline of trade and investment flows (Figure 4) could have severe consequences for these knowledge transfers and for innovation at the global level. Trade is not at the origin of the crisis, but since it binds economies closely together, it helps to spread developments from one country to another – the negative developments as well as the positive.

![Figure 4. World trade has plummeted](image)

Note: The first quarter of 2009 is an estimate.

Source: OECD.

12. The risks to global value chains emerge not only from the decline in international trade, but also from key suppliers facing bankruptcy, and from firms re-considering their investment strategies and retrenching to core markets. Protectionist policies could exacerbate these risks. It would increase the input costs for domestic industries and would penalise exporters twice, through higher costs and through retaliation from other countries.

13. Firms now rely on a global business model, and retrenchment risks disrupting international links, affecting growth and future innovation in both OECD countries and non-OECD economies. Coordination of government actions can help address these risks, can produce a more effective, longer-lasting solution and can also result in positive spill-over effects.

Human capital is being depreciated

14. Crisis-driven layoffs are on the rise in many OECD countries and experience from previous recessions shows that many skilled workers will become unemployed (see the example of Korea in Box 1 below). High tech industries (like IT, aeronautics or pharmaceuticals) and knowledge-intensive services (like financial services) are announcing layoffs almost daily. This human capital will quickly depreciate if the downturn is protracted. However, such talent could make an important contribution to the many innovative businesses that have experienced a shortage of skilled workers in the recent past, or could contribute to a new wave of innovative entrepreneurship.
15. Education and training are particularly important in the current crisis. In times of recession, budget constraints (in government, households and businesses) tend to reduce expenditure on education and training. On the other hand, due to rising unemployment, demand for training increases. Support for education and training during the current crisis can help displaced workers find new job opportunities and can thus support the restructuring process.

Incentives to develop a greener economy have weakened

16. Efforts to promote a greener economy can also be compromised by the current crisis. Lower oil prices have already reduced incentives to switch to alternative energy sources - and the declining prices of raw materials are reducing pressures to use these resources more efficiently. Environmental innovation is also affected as consumers buy less expensive goods. Firms are therefore reluctant to introduce innovations because it is more difficult to reap a price premium. Moreover, as banks have reduced credit, process innovations that could reduce costs (e.g. energy saving equipment) are more difficult to implement, as they imply capital investments. New entrants are also limited by lack of venture capital and declining market prospects.

17. On the other hand, the prospect of industrial restructuring creates opportunities for new and greener businesses, whereas the depreciation of currently installed equipment offers opportunities for the promotion of environmentally friendly investments.

3. But the crisis also offers opportunities to foster innovation for sustainable growth

18. Although the current economic situation poses hard new questions and choices for all governments, it offers an opportunity to strengthen the medium and long-term potential of the economy. Governments can incorporate forward-looking structural measures that inject innovation into the mix of policies being adopted to tackle the economic downturn. Some of these may add to demand in the short term, but most are more likely to offer benefits in the longer term.

Past experiences demonstrate the opportunities of crisis to enhance innovation performance

19. The governments of Finland and Korea both have demonstrated during past downturns that bold innovation policy initiatives can accelerate structural changes which face high obstacles in normal times (Box 1). Such initiatives require proper framework conditions and a coherent crisis strategy.
Box 1. Pro-innovation responses to crisis – the examples of Finland and Korea

**Finland** experienced an exceptionally deep economic crisis during the first half of the 1990s. Within four years, output was reduced by more than 10% and the unemployment rate quadrupled to almost 17%. External shocks (the collapse of trade with the former Soviet Union in 1991, but also a sharp downturn in the OECD area), combined with a domestic banking crisis, led to a collapse of consumption and investment spending.

Overcoming the crisis required drastic measures to improve competitiveness and to consolidate public finances -- at the same time as very costly measures were needed to revive the banking sector. Most public expenditures were cut almost across the board, and some taxes were raised. The main exception to this was R&D spending, which was increased rather than cut. In particular, the counter-cyclical support of TEKES (the largest Finnish Funding Agency for Technology and Innovation) proved very important in reducing the depth and length of the downturn in business R&D, which helped lay the ground for a strong rebound. The government decision to complement macroeconomic stabilization measures with sustained investment in infrastructure, education and incentives for structural change helped put the Finnish economy on a stronger, more knowledge-intensive, growth path following the crisis.

**Korea**'s experience also illustrates how good crisis management can accelerate structural adjustment. The Asian financial crisis of the late 1990s led to significant down-sizing among large firms in Korea. This process was characterized by mass lay-offs of highly-skilled personnel, and large reductions in corporate R&D spending. The response of the Korean government, in addition to boosting education expenditure, was to increase its R&D budget, to offset the decline in corporate R&D spending. Moreover, it used the crisis as an opportunity to develop a technology-based SME sector, using the Special Law to Promote Venture Firms (enacted in 1998). A co-ordinated mix of policy measures was put in place: regulations that helped improve the environment for venture start-ups and their growth; government-backed venture funds and tax incentives for investors; as well as measures to support research.

These measures fuelled rapid expansion in the number of corporate R&D labs (which numbered about 3,000 at the time of the crisis, but grew to about 9,000 by 2001) with SMEs accounting for 95% of this increase. On the eve of the crisis, there were about 100 “venture firms” in Korea. By the end of 1999, this number had increased to over 5,000, and by the end of 2001, it had grown to over 11,000. The long-term effects of these measures were striking. In 1997, SME spending accounted for just 12% of total business R&D, but by 2006, this figure had increased to 24%.

Of course, this success cannot be explained by policy intervention alone. The world-wide shift to a digital economy provided an exceptional business opportunity for people with technology and ideas – notably those being laid-off by large firms. Nevertheless, government action helped shape an environment that enabled new businesses to seize upon these emerging opportunities.

*Anti-crisis policy measures can provide built-in incentives to innovate*

20. Clearly, innovation will be one of the keys to emerging from the downturn and putting countries back on a path to sustainable – and smarter – growth. Many governments have incorporated measures to strengthen innovation in their stimulus packages, and can also take action to improve their long-term potential for innovation.

21. Mitigating the negative impact of the crisis on innovation is important as the crisis has magnified widely acknowledged market failures in innovation financing. Investment in innovation is now considered even more risky and some of the longer term investments in new technologies are particularly affected. Moreover, stimulus measures offer an opportunity to put available resources for innovation (notably skilled labour) to good use. In supporting private investment in innovation, care should be taken to ensure that government spending provides good value for money; the less promising innovation projects are among those abandoned first by the private sector and there is no reason to revive these with public money. Policies that can be considered in this context include:

- Focusing public support on promising research and innovation affected by the crisis, e.g. long term and risky research, research conducted by start ups, and research addressing societal challenges (environment, ageing etc.). Using existing instruments and vehicles for support can help maximise the short term impact.
• Well-designed existing public-private partnerships can help enhance the resilience of investments in R&D over the business cycle. One way of achieving this could be through adjusting the balance of public and private funding over the business cycle. Such partnerships can also be used at the local or regional level, e.g. in innovative clusters, to ensuring that government funds reach new and small players, thus reducing the risk of capture by “strong players”.

• As with other investments in infrastructure, investments in research infrastructure can contribute both to stimulating demand in the short term and supply in the longer term.

• Open and competitive public procurement can also be used to support innovation, especially where it contributes to solving social challenges, e.g. mobility, energy or health.

22. Governments also need to focus on medium to long-term actions to strengthen innovation. As discussed in the Interim Report on the Innovation Strategy, a broad range of policy reforms will be needed in OECD countries and non-OECD economies to respond to the changing nature of the innovation process and strengthen innovation performance to foster sustainable growth and address key global challenges. This involves, amongst others, fostering innovation in all its forms and broadening the focus of innovation policies beyond support for R&D.

23. In changing their approaches to innovation, governments also need to consider how to best support risk-taking, such as investments in innovative start-up companies. Regulatory reform of financial markets to address the financial crisis should consider the financing of innovative start-ups and the provision of appropriate incentives for risk-taking. Venture capital markets and the securitisation of innovation-related assets (e.g. intellectual property) have proven to be particularly important for many innovative start-ups. Existing support measures for new, innovative firms which limit the risk taken by entrepreneurs and capital providers can be updated to enhance their effectiveness.

24. New business opportunities and the reallocation of resources from declining activities towards emerging opportunities are vital to recovery. Governments will need to avoid locking-in old economic structures and business models. Supporting firms and industries that do not have a viable business model will thwart the restructuring required for more sustainable growth. Facilitating the creation of new firms and ensuring competition can help underpin such restructuring.

25. Governments can prepare for the next phase of innovation-led productivity growth, for example, by encouraging the entry and expansion of new businesses or the exit or re-orientation of existing businesses facing difficulties. Several policy avenues can be considered in this regard:

• Encourage firm entry and growth, e.g. by reducing the administrative cost of creating a new company; reducing the barriers to growth of small companies; or developing micro-credit for “necessity-driven” entrepreneurs, e.g. through loan guarantees to banks.

• Ease the liquidity constraint faced by small firms. The measures that have been put in place by countries can be classified in three different groups: a) measures supporting sales and preventing depletion of SMEs’ working capital such as export credit and insurance, factoring for receivables, tax reductions and deferrals, and better payment discipline by governments, b) measures to enhance SME’s access to finance, mainly to credit through bank recapitalisation and expansion of existing loan and credit guarantee schemes; c) measures aimed at helping SMEs to maintain their investment level and more generally their capacity to respond in the near future to a possible surge in demand through investment grants and credits, accelerated depreciation, and R&D financing.
26. Several countries have introduced policies that are intended to support industries particularly affected by the economic crisis, such as the car industry. Introducing or increasing government subsidies to producers may undermine the long-term production capacity of the economy. Even if subsidies boost short term demand, they can backfire by postponing needed restructuring and wasting taxpayer funds. Furthermore, these subsidies can be protectionist measures, and may provoke retaliation from other countries and a global reduction in growth potential. Such measures therefore need to remain selective, and avoid bailing out firms which are not competitive.

27. Producer subsidies distort the marketplace and can multiply across sectors and borders as “equal treatment” is sought. If subsidies are made, their economic cost should be minimised by making them conditional on progress in industrial restructuring and attaching clear targets and strict limits in terms of size and duration. It is important to ensure that measures are consistent with long-term goals, notably higher productivity and the ability to respond to environmental challenges.

*Investments in a networked recovery can preserve ICTs as a key engine of growth*

28. The current crisis could also have negative effects on the communication sector which has been investing in high speed broadband networks and next generation switching technology. Telecommunication incumbents have historically had strong cash flow positions but face increasing difficulties raising sufficient capital. Smaller new entrants, with fewer assets and lower cash flow, may be disproportionately affected by capital shortages. There is also concern that incumbents will use the financial crisis as a means to obtain regulatory concessions from governments in exchange for promises to invest. Such concessions would have negative effects on the development of long term competition in the sector, innovation and lower prices.

29. Investment in high speed broadband communication networks that are part of economic stimulus packages must be accompanied by regulatory frameworks which support open access to networks and competition in the market. Such investment should also aim at stimulating the use of information and communication technologies (ICTs) to secure economic and social benefits. Linking ICT investment with other large physical infrastructure investment, such as buildings, roads, transportation systems, health and electricity grids, allows them to be “smart” and save energy, assist the aging, improve safety and adapt to new ideas. These infrastructures can also lower the barriers to entrepreneurial activities and provide means for the efficient and “green” delivery of energy, mobility and important social services – training, job search and networking.

30. Given the costs involved in fibre deployment it is fairly certain that outside the dense urban areas the market will not be able to support more than one fibre based network. The exception may be in markets which already have well developed and ubiquitous, cable TV infrastructures which may provide an alternative and competing platform. Governments, both central and municipal, can play an important role by facilitating investment, e.g. through public-private partnerships which stimulate development of nationwide high speed broadband networks. However, when the public pays for broadband investment they should expect to benefit from improved service and greater choice in the market place. One means to accomplish this is to ensure that networks built or augmented using any public funding are available via “open access” rules meaning network providers offer access or capacity to all market participants at cost-based, non-discriminatory terms.

31. Outside the OECD area, there is a risk that the economic crisis will slow the catch-up of developing countries in terms of access and use of ICT infrastructure, thus increasing the digital divide.
The crisis also presents an opportunity to scale up investments in people

32. The crisis also presents an opportunity to raise investment in human capital. Support for education and training can accelerate the healthy transition to new jobs and emerging opportunities. It is also essential for innovation, which requires a broad set of skills. Building such skills starts in primary school and continues through firm-based training and lifelong education. Policy initiatives include:

- Investment in educational infrastructure, which can also support demand. For example, many countries face challenges regarding school buildings. Renovating the school infrastructure (e.g. in integrating ICT and building more ecologically-friendly schools) can also foster more innovative and effective learning environments.

- Reforming education and training policies. Some countries are using the crisis as an opportunity to reinvigorate reforms to higher education institutions or training policies, e.g. Spain and Portugal. Such reforms are needed in many countries in any case, but are also required to adapt to the emerging needs of a post-crisis society. The crisis will accelerate structural changes: new sectors will appear; old ones will fade away; new work organisations will be introduced; thus increasing the need for new skills. Training should therefore be encouraged notably in restructuring industries where the skill mix is more likely to change. As demonstrated in the OECD Innovation Strategy, entrepreneurial skills and attitudes, risk-taking behaviour, creativity, etc. will be crucial competencies in the economy of the future that need to be nurtured by more adaptive and innovative education and training systems.

- Enhance support for students from low-income households. For example, the Federal Reserve Board of the United States is supporting the issuance of asset-backed securities (ABS), collateralized by student loans. In Russia, the government has put policies in place, such as low interest rate student loans, an increase in state scholarships, a freeze of tuition fees and free student accommodation, to help enhance access to education.

The crisis can serve to prime the greening of the economy

33. The current economic crisis should be used to strengthen efforts to achieve low-carbon economic growth. Recent OECD analysis shows that ambitious policy action to address climate change makes economic sense, and that delaying action could be costly. Providing that governments send a clear policy signal now about their medium and long-term climate change objectives, OECD analysis suggests that the actual cost of climate policy measures could be quite low in the initial few years, while countries are still struggling to move out of the crisis, notably in enhancing energy efficiency.

34. The crisis offers an opportunity and an incentive to improve efficiency in the use of energy and materials, to move towards more sustainable manufacturing, and to develop new green businesses and industries. Dealing effectively with many environmental challenges will require investment in innovative energy-efficient buildings and transport systems, alternative energy supplies and “smart” electricity grids, pollution control, as well as investments in environmental infrastructures, such as sea walls to protect coastlines. Investing in the environment is thus an important element of many of the stimulus packages being put in place by governments in OECD and emerging economies. As with other elements of the stimulus packages, “green” investments should not be used as a cover for protectionist measures. Support programs, for example, should not be tied to the purchase of nationally-produced construction materials.

35. The crisis can also be a spur to much needed structural reform, where there is an opportunity for both economic and environmental gains. It provides an opportunity to reform or remove policies that may be expensive, inefficient and environmentally harmful. Examples of immediate win-win policies that governments can take advantage of include:
• Remove subsidies to fossil fuel-based energy production and consumption.
• Cut trade barriers to climate-friendly goods.
• Address market failures that prevent improvements in the energy-efficiency of buildings and transport systems.
• Reform policies that could achieve a given environmental objective more cost-effectively.

36. Such policy reforms will also improve the incentives for innovation, as they remove distortions in the market. At the same time, investors need a clear and credible price signal now to invest in a greener future. It is not a choice between better pricing or stimulation of technological innovation: Both are vital. OECD analysis clearly shows that better pricing will likely be one of the best triggers for the development and diffusion of greener technologies. New technologies, such as carbon capture and storage (CCS), will not be aggressively deployed in the coming decades without a clear carbon price. Even with such a price, however, the development and implementation cost of some technologies may be very high initially, and government investments in demonstration facilities may be needed.

37. Governments will also have to share the risk of new technologies with the private sector. A number of co-financing measures are already being employed by countries, including: R&D tax credits and public procurement policies to help stimulate private investment; public-private collaboration on R&D projects, including research clusters together with academic institutions; and selective targeted measures to support innovation in small and medium-sized enterprises (SMEs). Public R&D policies are particularly important now, when the private sector may have more difficulty making such investments. In the energy sector, public R&D has been falling since the early 1980s and greater public spending could potentially have a high return.

4. Looking ahead, the OECD Innovation Strategy will contribute to maximising the benefits of innovation

38. As policy makers work to stabilise financial markets and strengthen short-term demand, they can leverage the crisis to build the foundations for stronger long-term growth and a transition to a greener economy. Many of the stimulus packages being introduced in OECD countries include components to support innovation, entrepreneurship, infrastructure, human capital and green investments, to foster more efficient and sustainable economic growth.

39. Today’s world is one in which both OECD countries and non-OECD economies increasingly rely on knowledge and services to drive their performance, where investment in intangible assets is of equal importance as investment in machinery, equipment and buildings. Efforts to stimulate the economy must therefore reflect the current drivers of economic growth, and take advantage of industrial renewal to accelerate the important structural shifts underway.

40. Governments will need to assess the longer-term impact of the crisis on innovation especially since many look to innovation-induced growth as a spark for re-igniting growth. In all likelihood, the crisis will accelerate changes already underway: the increasing internationalisation of investments in innovation; the growing role of non-OECD Member countries such as Brazil, China and India in the global geography of innovation; the increasing reliance on “open” innovation strategies that rely on partnerships and collaboration to share costs and spread risk; and the broadening of the range of actors who are innovating, including users and consumers making use of the Internet as a collaborative platform. But the crisis could also have a detrimental impact as aversion to risk takes root, as reinforced nationalism puts limits on trade and migration and as tight economic conditions lead to an increase in cybercrime that could erode trust in the Internet.
41. Innovation policies should be adapted to current conditions, in terms of policy design for both short-term stimulus packages, as well as medium- and long-term initiatives. Policy instruments will have to be adapted to the more international and open character of innovation and to the central importance of non-technological innovation. Equally important, innovation policies must form part of a coherent and well-designed government strategy that takes account of the interactions and complementarities between different policies and increases the overall efficiency of resource allocation. In the current context, it will be particularly important that policies in response to the crisis will continue to provide sufficient incentives for risk-taking, a key driver of innovation. The OECD will continue to work on these issues as the crisis evolves. The development of the OECD Innovation Strategy, which will be presented to Ministers in 2010, will be a key step forward beyond the crisis and towards sustainable growth.