

*“In this period of rapid industry transformation and adoption of new technologies, Canada needs to now invent products others will manufacture – not just manufacture products others have invented.”*

## **CAPC Submission on a Canada Innovation Strategy, August 31, 2016**

The Canadian Automotive Partnership Council (CAPC) is pleased to provide recommendations and advice to the Government of Canada in support of its efforts to foster economic growth by building a more innovative country. We also welcome the opportunity to work with the Government to address and implement our recommendations.

### **Transformation and Change in the Global Auto Sector**

Rapid advancements in technology, changes in consumer preferences and new entrants into the global auto sector are inspiring new automotive products, services and business models that will be increasingly electric, digitally connected, autonomous and part of the sharing economy. Lux Research, IDC has projected that autonomous vehicles will be an \$87 billion industry by 2030. In North America, the auto sector is also investing over \$200 billion on new ‘green technologies’ that will improve fuel economy by 50% and significantly reduce greenhouse gases from light duty cars and trucks. The pace and scope of technological change has never been more profound.

*For Canada this represents an opportunity.*

For the past century, Canada’s automotive industry has been centered upon manufacturing vehicles and supplying vehicle assembly plants as part of an integrated North American auto sector. Canadian based manufacturing investment today faces strong headwinds from global competition, shifting trade patterns and agreements and a range of policy and macro-economic factors. Canadian assembly plants have strong quality performance and remain at the forefront of innovation, enjoying the same general technological advantages as other auto plants across the globe through their embrace of global manufacturing systems. Canada must continue to focus on manufacturing quality, productivity and innovation, but these strengths have increasingly become “table stakes” in the global auto industry.

In face of these global manufacturing headwinds, innovation must become THE pathway to automotive industry growth in Canada. While the industry focuses on manufacturing competitiveness through groups such as CAPC, we have not historically focused on Canada as a growth location for invention, research & development (R&D) and engineering of new automotive products and technologies. This has reflected differing OEM (Original Equipment Manufacturer) mandates and varying proximity of OEMs to their engineering headquarters.

Global industry disruption, and the acceleration of technological change across the global auto sector has however started to encourage global companies to look again at Canada’s key strengths and examine new possibilities for overflow innovation work to be conducted in Canada by OEMs, academic and research institutions and emerging Canadian technology companies. One example of this change is General Motors’ June 10, 2016 announcement that it will expand its Canadian innovation and engineering ecosystem to 1000 engineering and R&D positions working in the areas of Autonomous Vehicle Software & Controls Development, Active Safety and Vehicle Dynamics Technology, Infotainment and Connected Vehicle Technology.

***Put simply, in this period of rapid industry transformation and adoption of new technologies, Canada needs to now invent products others will manufacture – not just manufacture products others have invented.***

## **The Opportunity for Canada**

Key demand for auto innovation today is focused in emerging areas like strong, light-weight materials, mobile communications, sensors and controls, software development, data analytics, artificial intelligence, cyber security and advanced battery technology. Many of these fields align well with areas where Canada has demonstrated strength and pioneering expertise. The global industry also continues to drive innovation in more traditional manufacturing processes so Canada and its suppliers must keep focused on this as well.

By developing an integrated auto *innovation* strategy, Canada has an opportunity to generate new pathways for economic growth, higher paid employment and the development of new globally scaled Canadian companies able to compete as part of the global auto sector.

But to achieve this, Canada's auto industry participants require:

- Access to Talent;
- Access to Customers;
- Access to Capital;
- A welcoming Regulatory and Intellectual Property environment.

This paper gathers together observations and recommendations from CAPC committees and other participants and sets them out in these four areas:

### **1) Access to Talent**

There is a global auto industry scramble underway to foster, grow and attract specialized talent required in R&D areas such as strong, light-weight materials, mobile communications, sensors, software development, data analytics, artificial intelligence, cyber security and advanced battery technology. Canada has a head start in the talent department with its strong educational system and valuable knowledge assets in its universities, research institutions and companies. Ontario's focus on STEM education is producing a leading base of educated students. Its coop programs are exemplary and several of its universities have become world leaders in areas such as software development and artificial intelligence. Global ICT and now auto companies have taken note. Talent is the essential foundation for the future of Canada's innovation economy.

Yet challenges remain. High numbers of Canadian graduates in preferred fields continue to migrate to California and elsewhere to pursue careers in areas of emerging technology, including automotive. Canada has an enviable base of academic science research but it has famously struggled to commercialize it or strategically align it with the evolving needs of specific industries. Canada lacks strategic coordination between the needs of its key growth industries and the strengths of academic and research institutions. It lacks the data required to better align what we have with what the market needs.

Canadian based employers also have concerns with government policies such as the Trained Foreign Workers Program which are too slow in responding to their needs for a mix of domestic and specialized

international expertise required to succeed in international markets. Canada enjoys a strong entrepreneurial base but it suffers gaps in teaching entrepreneurs how to scale internationally in the information economy. This includes the strategic importance of managing intellectual property as an essential “freedom to operate” strategy for scaling businesses. You can only commercialize an idea if you own the IP associated with the idea. Canadian entrepreneurs must adopt strategies to leverage and manage their IP.

CAPC proposes to work with Canada and Ontario on the following areas of priority relating to talent:

- Complete an inventory of Canada’s skills and R&D capabilities across our supplier community, universities and other research institutions and map these against the automotive manufacturing, technology development and engineering needs of global automotive OEMS and suppliers;
- Expand and strengthen our leading talent development / student competition programs such as First Robotics, Eco-Car Challenge and develop new Canadian skills competitions in areas such as autonomous mobility and software coding;
- Initiate a university Capacity Development advisory group with government and the auto sector to ensure appropriate continued investment in universities’ ability to produce the right volume of graduates with the right skills related to the innovation economy;
- Introduce a tax benefit for employers to expand coop education opportunities;
- Address deficiencies in the federal Trained Foreign Worker program and replace it with a new “Global Talent Visa” or “Trusted Employer Visa” program; and
- Strengthen educational programs for Canadian scale up companies including strategic Intellectual Property management.

## **2) Access to Customers**

Innovation without customers has minimal economic value. As noted by the Jenkins Panel on innovation, “An effective collaboration among business, government and higher education depends on a solid link between the “supply-push” of research and discoveries and the “demand-pull” of firms seeking to exploit the commercial potential of new ideas.”

In Canada, government or academic sponsored programs that seek to demonstrate Canadian automotive innovation capabilities may well advance local knowledge, but they generally will not generate new economic activity unless they are informed by knowledge of customer needs and demand. “Innovate and they will come” is not a strategy – and yet it is an approach often pursued in Canada with little customer direction or engagement. Innovation is a dynamic customer focused process and therefore building industry relationships with key developers and purchasers of new technology is essential if we wish to commercialize our Canadian knowledge assets.

Fortunately, for over a century, Canada’s domestic automotive sector has a high degree of access to the global automotive industry and its supply chain. These essential relationships with global automotive supply chain decision makers flows through a mix of wholly owned subsidiaries of global auto makers; regulators; auto dealers; numerous domestic and international Tier 1 and Tier 2 suppliers and a growing range of start-up and scale up technology companies also seeking to supply the global auto supply chain.

Canada needs to map and engage the OEM decision makers with a strong focus on manufacturing and emerging technology.

Auto Advisor Ray Tanguay, CAPC itself, Canada and Ontario are currently conducting research and seeking to better define a Canada automotive value proposition and better communicate it. The availability of relevant talent and a strong Canadian innovation ecosystem is of particular interest to global automotive companies seeking to respond to the transformational changes in the global auto marketplace today.

Innovation ecosystem building does not happen by accident – witness excellent examples in Kitchener Waterloo and Ottawa. Canada should take a purposeful approach to expanding its auto innovation ecosystem (i.e. at the intersection of OEMs, suppliers, universities, research institutions, incubators and startups). This will nurture important new networks of supplier-customer (OEM) relationships. Government should take an active role in coordinating events in this space. Government itself can also serve as a customer for developing innovation companies through its procurement policies as recommended by the Jenkins panel on Innovation.

CAPC proposes to work with Canada and Ontario on the following innovation priorities relating to engaging customers:

- Complete CAPC directed studies to map out priority global industry technology needs (OEM customer need) and align this against Canada’s talent and capacity inventory so recommendations can be made for further focus and action;
- Complete CAPC directed research to better define Canada’s “innovation value proposition” in relation to OEM priority needs and requirements;
- Initiate new collaboration and “ecosystem building” initiatives such as conferences and events to help foster supplier customer relationships and build more effective pathways to global OEM decision makers; and
- Support emerging Canadian automotive technology companies (start-ups and scale-ups) through government procurement support for innovative new products and technologies.

### **3) Access to Capital**

Access to capital and other financial incentives are key tools countries use to develop effective innovation industries and ecosystems.

Canada needs to tailor its automotive financial policy supports to the stages of commercialization of the funding beneficiaries and recognize that milestones for innovation incentives cannot be generic. It should be recognized within Canada’s innovation funding programs that innovation is non-linear and subject to failure before there are substantial successes or breakthroughs. It should also be realized that the type of support required by a Canadian start-up company is different from that of a scale up company or an OEM.

Canada offers a range of financial incentives related to innovation activity but these have achieved mixed results within the auto sector

The prime sources of large scale automotive support in Canada are the federal Automotive Innovation Fund (AIF) and the Ontario Jobs and Prosperity Fund – which often work together on large auto

investment incentive programs. While the Jobs and Prosperity Fund has proven very effective, a longstanding CAPC recommendation has been to reform the federal AIF toward grants and away from long term loans, to ensure the AIF remains competitive with incentives offered in other jurisdictions. In its most recent budget, the new federal government indicated that it plans to examine changes to the AIF by the autumn of 2016. These programs should continue to offer graduated support for investments in auto manufacturing and significant OEM R&D work in Canada.

Canada's new federal Automotive Supplier Innovation Program (ASIP) is a step in the right direction to provide support for company based innovation and new product development in the middle stages of the innovation process. The ASIP's project selection criteria, participant eligibility, funding criteria and application and approval process should be reviewed with industry input to ensure it is in step with rapidly changing technology and industry needs and to address challenges that have been identified by the supplier community in Canada.

Canada's flagship SR&ED tax credit incentive program benefits profitable domestic companies conducting R&D but it remains complex, costly and generally offers limited tax effectiveness for multinational auto or technology companies and limited value for start-ups without profit. While Canada invests \$3 billion per year through SR&ED, multinational companies have some \$10 billion of unused SR&ED credits on their books. As noted by the Mowat Centre, "Canada is an extreme outlier in weighting its investment in innovation so heavily toward tax incentives and away from direct support to sectors." The ASIP program is a positive step to help address this for the auto sector but it is limited in funding and too narrowly focused on small to medium sized suppliers.

Meanwhile, Canadian companies seeking to scale up their operations continue to find access to private or public sector venture capital challenging.

CAPC proposes to work with Canada and Ontario on the following priorities to improve the effectiveness of financial supports for automotive innovation in Canada:

- Improve the federal Automotive Innovation Fund by shifting from loans to grants including support for manufacturing investments and qualified company-based innovation / R&D work performed in Canada;
- Work with CAPC members and others to better focus the Automotive Supplier Innovation Fund to improve uptake by Canadian automotive suppliers;
- Explore limited refundability for accumulated SR&ED credits to increase qualifying automotive R&D work in Canada under select conditions or limits;
- Increase availability of Venture Capital for automotive scale up companies by adopting a matching Canada / Ontario version of the British Columbia 30% refundable tax credit for venture capital investors up to \$200,000; and
- Adopt a "patent box" tax credit on income generated by IP owned by Canadian scale up companies.

#### **4) A Welcoming Regulatory and Intellectual Property Environment**

As OEMs increasingly look to Canada as an important source for talent and innovation, Canada has an opportunity to establish an inviting innovation ecosystem that drives high value economic growth. But

Canada's governments need to take a strategic approach that comprehends and addresses the specific innovation needs of the auto sector. Governments across the world are now playing a facilitating role in helping to align players, develop relevant technology testing programs (for example for new autonomous technology or cybersecurity), engaging global supply chain purchasers and ensuring an inviting regulatory environment for this activity.

Governments can also ensure that new infrastructure spending is done with a focus on developing, testing and commercializing new smart infrastructure systems, including highways and new bridge crossings such as the Gordie Howe Bridge, to support the efficient movement of goods and to anticipate new autonomous vehicle use.

While governments can assist their emerging technology champions to grow, their policies and regulations can also stifle innovation. Regulators, agencies and institutions can have strong impacts on the decision of global OEMs to undertake R&D activities in a jurisdiction. Regulations enabling, for example, the testing of autonomous vehicles can support new partnerships and investments. Other regulations – for example, the limiting of access to foreign talent or policies that restrict new customer services available elsewhere, can discourage R&D investments in Canada.

Governments also play a strategic role in helping to develop the relevant knowledge base in their country and ensuring start-up and scale up companies have the strategic capacity to grow and compete in the global ideas economy of the 21<sup>st</sup> century.

Countries seeking to build economic advantage for their technology companies in the new ideas economy have developed sophisticated strategies to help them compete and grow. The move to a high value global ideas economy is a reality Canada must prepare its new companies to face. Almost 80% of US exports today are IP based. The US grants 600,000 patents /year and China grants 1,000,000,000. Countries like France, South Korea and Japan have developed strategic patent pools that can strengthen and enable their global champion companies.

In today's global economy, ideas are the intangible goods that drive innovation. Ideas can be owned as intellectual property through patents but the markets for these intangible goods are in turn regulated by government laws, regulations, agencies, standards or courts. Innovators therefore require increasingly sophisticated strategies to manage their IP and ensure their "freedom to operate".

The development of innovative new automotive technologies and business models is creating new opportunities for domestic Canadian suppliers or scale up companies to develop, own and sell new patented ideas or technologies. It is common practice in the auto sector for suppliers to retain ownership of their IP. As such, IP based auto technology companies that participate in the global automotive supply chain have the potential to expand, generate ongoing licensing revenues while also creating new high value employment in Canada.

CAPC proposes to work with Canada and Ontario on the following priorities related to the establishment of a positive innovation ecosystem:

- Government needs to "pick some lanes" and focus policy and support on building clusters of relevant automotive OEM, supplier and start-up R&D in Canada;

- Governments, aligned with industry, should serve as active facilitators and coordinators of new technology Testing and larger scale Demonstration Projects (for example for autonomous driving, cybersecurity) carried out by industry and engaging OEM technology purchasers;
- Governments can ensure new transportation infrastructure is planned and developed to include the development, testing and commercialization of new smart infrastructure systems;
- Identify and track regulations that encourage or dissuade automotive innovation in Canada and propose solutions that enable investment in automotive innovation in Canada;
- Explore the development of Canadian automotive patent pools including IP derived from Canada's academic and research institutions to benefit emerging Canadian technology companies offering value to the auto sector;
- Work with CAPC for input on the development of a focused automotive R&D centre within the National Research Council and reevaluate its focus with industry periodically; and
- Explore opportunities to lower barriers between Canadian academic institutions to enhance collaboration in key areas of automotive innovation and intellectual property.

## Some Terms and Definitions

When considering the development of innovation policy or a sectoral innovation strategy, it is useful to keep in mind some definitions and distinctions.

### a) “Auto Manufacturing” versus “Product R&D”

“Advanced manufacturing” is often referenced as a panacea for Canada’s auto sector. It is useful to distinguish between *auto manufacturing* – an advanced process utilizing sophisticated robotics, computer systems, complex sequencing and logistics, and *auto engineering and R&D* – the process of inventing, testing, integrating and optimizing new products and services. These tend to be distinct areas of focus within most global auto companies and therefore require distinct customer engagement strategies.

While Canada enjoys highly advanced capabilities in its auto assembly plants, manufacturing investment mandates are impacted by competitiveness factors such as the relative cost and quality of labour, energy, logistics and other input costs; trade agreements and financial incentives. Product Engineering and R&D investment is more dependent upon factors such as engineering talent, alliances with academic institutions, intellectual property policy, effective financial supports for company based innovation and a range of other innovation policy enablers.

### b) « Invention » versus « Innovation » versus « Commercialisation »

*Invention* is a process of coming up with a truly new idea or approach. It can generally be owned and protected through patents or other intellectual property rights.

*Innovation* is the process of using ideas to improve existing products or services. It generally involves a process of experimentation, trying new approaches, failing, testing, trying again and validating improvements. Innovation does not guarantee the commercial sale of an improved product.

*Commercialization* is a process of taking a validated product or service to customer markets for sale. It includes investment in customer research, regulatory analysis, marketing and scaling up volumes.

### c) “Start-Ups” versus “Scale-Ups”

*Start Up companies* are in the process of finding a market fit for their product or service, experimenting to find customer value.

*Scale Up companies* have validated products or services, often with intellectual property but they need to grow.



## Other Reading and References:

**CAPC Call For Action II** “The Canadian automotive industry has demonstrated pockets of significant and meaningful investments in Canadian research infrastructure. These investments, however, have been inconsistent across segments and companies: the result of differing mandates and proximity. The industry must share best practices and set a positive, mutually beneficial path going forward so that the capabilities of the Canadian research community are understood, represented, and accessed.”

### From Auto Advisor Report (January 2016) – Technology Recommendations

- Map Canada’s information technology sector to better understand and promote Canadian strengths including in information technology
- Promote capacity to develop new technology to meet environmental requirements and consumer demand
- Invest in and support development of new technology aligned with future direction of industry
- Retain programs like ASIP which support ongoing innovation in suppliers
- Seek formal collaborative agreements for R&D and technology development with Michigan, Ohio, Germany and Japan

## Other Reports

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The Institute for Competitiveness & Prosperity

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### [\*Canada’s Innovation Underperformance: Whose policy problem is it?\*](#)

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Panel Review of Federal Support to Research and Development

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### [\*State of the Nation – Canada’s Science, Technology and Innovation System: Aspiring to Global Leadership\*](#)

The Science, Technology and Innovation Council (STIC)

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Jayson Myers

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Daniel Munro & Sheila Rao

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[Global ranking tell worrisome tale about state of Canadian innovation](#)

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[Government investment can reverse Canada's business innovation deficit](#)

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Peter Nicholson, Bob Fessenden, Marcel Cote

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["General Motors Announces Expansion of Connected and Autonomous Vehicle Engineering and Software Development Work in Canada to Reach Approximately 1000 Positions" \(www.GMinnovates.ca\)](#) [June 2016](#)