



CANADIAN GLOBAL AFFAIRS INSTITUTE  
INSTITUT CANADIEN DES AFFAIRES MONDIALES

# **Infrastructure, Attitude and Weather: Today's Threats to Supply Chain Security**

by Stephen Blank

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## ▶ **Executive Summary**

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*The global economy can be viewed today as a myriad of border-crossing supply chain networks of production, supply, distribution and marketing systems. Given the enormous value embodied in these systems, and an environment increasingly characterized by uncertainty and vulnerability, it is not surprising that concern about supply chain security has intensified. Concern takes many forms. For example, how supply chains might be used as vehicles for criminal activity (smuggling, trafficking of narcotics and importing counterfeit goods) or acts of terrorism (radio-active materials, bombs, even nukes in containers). Technology-based threats to supply chains, such as cybercrimes, data breaches and IT failures, now appear more frequently in the literature on supply chain security. These threats could result in substantial disruption to supply chains and damage to companies and their customers. But larger storms are brewing, whose menace to supply chain security is greater still – and where actions to protect supply chains move more slowly. These include the continued deterioration of transportation infrastructure, a new posture on trade which views supply chains as threats to jobs and wages, and the impact of climate change. These threats do not lie off in the distant future; they are threats of today and tomorrow.*





**T**he global economy can be viewed today as a myriad of border-crossing networks of production, supply, distribution and marketing systems. These networks, reports the OECD, “have become a dominant feature of world trade, encompassing developing, emerging, and developed economies....The whole process of producing goods, from raw materials to finished products, is increasingly carried out wherever the necessary skills and materials are available at competitive cost and quality.” Given the enormous social and financial value embodied in these systems, and an environment increasingly characterized by uncertainty and vulnerability, it is not surprising that concern about supply chain security has intensified.

Concern takes many forms. For example, supply chains might be used as vehicles for criminal activity (smuggling, trafficking of narcotics and importing counterfeit goods) or acts of terrorism (radio-active materials, bombs, even nukes in containers). Responses to these concerns deal mainly with securing containers (using seals and sensors to prevent enroute tampering) and testing at ports of embarkation and debarkation.<sup>1</sup>

Alarms of technology-based threats to supply chains such as cybercrimes, data breaches and IT failures, are being raised more frequently.<sup>2</sup> These incursions could disrupt supply chains and damage companies and their customers.<sup>3</sup> Risk managers and insurance experts rate cyber incidents as the greatest long-term future risk – and one of the most difficult to prepare for.<sup>4</sup>

These are serious threats to supply chain security, but other developments menace the very ability of firms to continue to build corporate strategies on the widespread and reliable interconnectivity that supported the emergence of a global economy in the past two decades. In this view, the primary threats to supply chain security are the deterioration of North America's freight transportation infrastructure, the growing rejection of the rules of trade that make extended supply chains possible and climate change.

## **THE DETERIORATION OF NORTH AMERICA'S FREIGHT TRANSPORTATION INFRASTRUCTURE**

Today's global production systems rest on a massive transformation of freight transportation. Major changes in regulatory frameworks helped increase transport productivity, while new transport logistics provided for just-in-time delivery. Improvements in transport technologies and efficiency were found in larger scale ocean shipping, unit trains on land and the expansion of containers.

Deferred maintenance and inadequate investment in highways, bridges, railroads, marine and air transport, and border crossings infrastructure have undermined our ability to keep up with these changes and with the increasing volumes of goods flowing across North America. The most recent American Society of Civil Engineers “Report Card” on infrastructure marks the US infrastructure “QPA” a D+. Inland waterways get a D- and roads a D, while ports score C and rail rises to the top of the class at C+.<sup>5</sup> None of this is new. In 2006, then UPS CEO Mike Eskew stated, “What's shocking, quite frankly, is the inability of our transportation infrastructure to keep up with the normal day--to-day stresses imposed upon it... Our highways, waterways, railroads and aviation network are simply not keeping up with ordinary demands.”<sup>6</sup>



The Canadian situation tracked the US. In Canada, transport infrastructure spending was a casualty of deficit reduction strategies adopted by federal and provincial governments in the early 1990s. The result was a growing infrastructure gap as many provinces found that their public road and highway spending was inadequate to maintain design specifications.

In 2007, the Conservative government recognized the growing infrastructure problem and announced the Building Canada Plan.<sup>7</sup> Stated Finance Minister Cannon: “Much of our public infrastructure is nearing the end of its expected lifespan and needs upgrading or replacing. Without significant investment in the country’s critical physical assets, there is a risk that Canada will fall behind in the global economy and face challenges in maintaining a high quality of life for all Canadians.”<sup>8</sup> Still, the infrastructure deficit remained. In 2014, a leading think-tank restated the same plaint: “Canadians are impacted by infrastructure that has failed to be maintained or that remains to be built. This is apparent in the deterioration of our roads and highways, the over-capacity of our public transit systems, underinvestment in affordable housing and social infrastructure, and the increased prevalence of environmental incidents, such as flooding in our urban areas. Canada’s infrastructure, along with the institutional frameworks that fund and finance these assets, are in need of repair.”<sup>9</sup>

But repairing existing infrastructure is not good enough. We must fashion an efficient, sustainable and secure freight infrastructure that will support North American competitiveness in the 21<sup>st</sup> century. This requires serious strategic thinking about what our freight transportation needs will be in coming decades and how to achieve them.

Actually, the US came close to something like this. Seeing a dramatic increase in north-south freight traffic in the early 1990s, Washington devised the first of a series of highway bills. The US Intermodal Surface Transportation Efficiency Act (ISTEA) and those which followed were big, complex and expensive legislative packages.<sup>10</sup> ISTEA, the first national transportation legislation since the Interstate Highway system, was designed to create an economically efficient and environmentally sound National Intermodal Transportation System, the foundation for US competitiveness in the global economy. It called for the designation of a National Highway System (NHS) – an interconnected network of highways linking major population centers focused heavily on new North-South Corridors that would support rapidly growing Mexico-US-Canada trade.<sup>11</sup>

A comprehensive assessment of the impact of this legislation has not yet been undertaken, but several points are critical. First, the legislation (up to MAP-21) failed to lay the foundation for an “economically efficient and environmentally sound National Intermodal Transportation System” – nor even a rationalized North American superhighway system. More high priority corridors were designated and more money for individual projects spent, but nothing like a coherent, rational North American highway system emerged. Second, in the course of these acts, Congress took greater control over the allocation of funds. Any sense of a coherent national plan was lost in a flood of individual project “earmarks”.<sup>12</sup> Third, even the more elaborated plans to reinvigorate national infrastructures involved little cross border planning and collaboration. Finally, our freight transportation systems have continued to deteriorate. North America’s Class 1 railroads are world leaders in efficiency and sustainability. But our rail systems continue to operate on mid-19<sup>th</sup> century, east-west economic geography, not geared to new north-south dynamics and very much hinged on highly congested Chicago. Our system of waterways and canals has deteriorated even more. Without new thinking on railways and other forms of freight



transportation, trucks will continue to be our dominant freight carrier – moving between 60% and 70% of freight loads, and will roll on more and more congested highways.<sup>13</sup>

Will MAP-21 make a difference? MAP-21 has focused more on freight transportation than its predecessors. It is mandated to create a national freight strategic plan and the Department of Transportation is to establish a national freight network to help States improve freight movement on highways. But highways are prioritized over other transportation modes, when rail and water should be central to a 21<sup>st</sup> century freight transport system, and the freight strategy is state-centered and does not look to a national system – not to speak of a continental system.<sup>14</sup>

Money is tight,<sup>15</sup> and more politically pressing issues of urban transit and potholes jostle against freight transportation. Efforts will focus more on repairing existing infrastructure rather than building for the 21<sup>st</sup> century. Supply chain efficiency will almost certainly suffer.

## **GROWING OPPOSITION TO TRADE POLICIES OF PAST DECADES**

Meanwhile, growing opposition to trade policies of past decades could undermine the very foundations of global supply chains – indeed, of a deeply integrated global economy.

What is alarming now is not that Americans are ambivalent about free trade. Rather it's that trade has become such a prominent issue in the 2016 election, and the views expressed by Trump and Sanders on trade have become so extreme: “The rhetoric of the 2016 presidential campaign has effectively weaponized free trade, turning it into a proxy for corporate greed, in Sanders’ critique, or for government incompetence and politicians who put the interests of corporate contributors over those of everyday Americans, in Trump’s.”<sup>16</sup> That Democratic and Republican candidates seem to share a suspicion of trade is unprecedented.<sup>17</sup>

Canadians, after the tumultuous debate over the US-Canada Free Trade Agreement, have been generally in favor of free trade agreements and pleased in general with their relationship with the US. Certainly the present Liberal government is strongly free-trade. But, with a falling dollar and an uncertain economic outlook, there is evidence of more concern – though not rejection – of free trade agreements. Like Americans, Canadians worry about possible job loss caused by new trade agreements.<sup>18</sup>

Americans as a whole have not rejected free trade. A Pew Research Center report finds that US voters are divided in their view of the impact of free trade agreements: 47% say free trade agreements between the US and other countries have been good, while 43% say they have been bad. But the same report indicates that less than a fifth of Americans believe that trade creates jobs or improves wages.<sup>19</sup> Voters respond, it seems, to demands to “bring jobs home.”

Trade has contributed to polarizing Congress, particularly over the last decade when Chinese imports increased. Trade-induced polarization has had a significant effect on the overall ideological makeup of Congress, which means that trade will surely remain a deeply divisive issue in US politics no matter who is president.<sup>20</sup>

The emerging conversation on trade suggests that global supply chains will be viewed by many in our government as job-destroying problems rather than growth and efficiency assets.



The struggle over trade is being fought out against a background of fundamental changes in our environment which are likely to exert major pressures on supply chains.

## CLIMATE CHANGE

Vital infrastructure that supports supply chains will be affected by climate change and the increase in many types of extreme weather it causes.<sup>21</sup> The US National Climate Assessment report states:

Climate change will affect transportation systems directly, through infrastructure damage, and indirectly, through changes in trade flows, agriculture, energy use, and settlement patterns.... Transportation systems are already experiencing costly climate change related impacts.... Over the coming decades, all regions and modes of transportation will be affected by increasing temperatures, more extreme weather events, and changes in precipitation.... Transportation systems are also vulnerable to interruptions in fuel and electricity supply, as well as communications disruptions – which are also subject to climatic stresses.<sup>22</sup>

Coastal systems are particularly at risk with immense potential impact on supply chain security. Six of the US's top ten freight gateways (by value of shipments) will be at risk from sea level rise. Seven of the ten largest ports (by tons of traffic) are located in the Gulf Coast.<sup>23</sup> The threat is not only rising ocean levels but also increasing frequency of disruptive weather events like hurricanes Katrina and Sandy. These events threaten not only ports but all transportation infrastructure in coastal and near-coastal areas – including, for example, large segments of the Northeast Corridor infrastructure. Experts agree that Canada's East and West coastal regions face the same threats.<sup>24</sup>

As threatening climate change is to ports – and to supply chain security – little has been done to adapt to this emerging situation. An EPA report concludes that port authorities have been more focused on reducing the “carbon footprint” of freight transportation. “However, most ports do not appear to be thinking about, let alone actively preparing to address, the effects of climate change.”<sup>25</sup> A recent survey of world port authorities finds that the majority are concerned about the impacts of sea-level rise, but not are yet implementing adaptation strategies.<sup>26</sup>

Inland regions have experienced severe precipitation events, hail, and flooding events, damaging roads, bridges, and rail systems and the vehicles that use them. Climate change could have similarly powerful impacts on production location and land-use patterns and will raise capital costs as localities around the world struggle to rebuild damaged infrastructure. In every dimension, climate change menaces supply chain security.

## CONCLUSION

That containers could become instruments of terror and the rising levels of cybercrime are both serious threats to supply chain security. Government and business leaders are well aware of these threats and surveillance and other counter-measures are underway to defend against them. But larger storms are brewing whose menace to supply chain security is greater still and



where actions to protect supply chains moves more slowly. These include the continued deterioration of transportation infrastructure, a new posture on trade which views supply chains as threats to jobs and wages, and the impact of climate change. These threats do not lie off in the distant future; they are threats of today and tomorrow.





<sup>1</sup> See, for example, Lawrence M. Wein, Alex H. Wilkins, Manas Baveja and Stephen E. Flynn, "Preventing the Importation of Illicit Nuclear Materials in Shipping Containers", *Risk Analysis*, Vol. 26, No. 5, 2006 Much has been done (C-TPAT, FAST) to enhance security at North American borders. Washington's 2012 National Strategy for Global Supply Chain Security lays out a government-wide approach to strengthen the global supply chain system. It establishes explicit goals: promote the efficient and secure movement of legitimate goods and foster a global supply chain system resilient to natural and man-made disruptions. Critics feel it reiterates existing policies without adding much new." See James Jay Carafano, Paul Rosenzweig and Jessica Zuckerman, *National Strategy for Global Supply Chain Security Falls Short*, Heritage Foundation, Issue Brief #3505 on Homeland Security

<sup>2</sup> See, for example, "The Maturing Cyber Crime Economy and Supply Chain: It's 'When' Not 'If'", *Future of Business and Tech*, <http://www.futureofbusinessandtech.com/business-solutions/the-maturing-cyber-crime-economy-and-supply-chain-its-when-not-if/>; Torsten George, "Don't Forget to Manage Supply Chain Risk", *Security Week*, November 13, 2013 <http://www.securityweek.com/dont-forget-manage-supply-chain-risk>; David Manners, "2016: Cyber-Crime Becomes Big-Time", *Electronics Weekly*, 31st December 2015 <http://www.electronicweekly.com/blogs/mannerisms/dilemmas/2016-cybercrime-becomes-big-time-2015-12/>

<sup>3</sup> One expert notes, "The flexibility, scalability, and efficiency of the technology that enables information sharing has created additional points of access to an organization's proprietary information, increasing the risk that the corporate knowledge that drives profitability may fall into the wrong hands. Particularly vulnerable are those processes and activities that involve the sharing of information between external supply chain partners." Drew Smith, "Is your supply chain safe from cyberattacks?" *Supply Chain Quarterly*, Quarter 2 2015 <http://www.supplychainquarterly.com/topics/Technology/20150622-is-your-supply-chain-safe-from-cyberattacks/>

<sup>4</sup> Jason McDowell, "What Keeps Supply Chain and Risk Managers Up at Night?", *Inbound Logistics*, March 2016, p.28

<sup>5</sup> <http://www.infrastructurereportcard.org/>

<sup>6</sup> UPS Pressroom: Current Press Releases, "Transportation Infrastructure Failing the Nation, Says UPS CEO" (March 30, 2006)

<sup>7</sup> Government of Canada, Speech from the Throne, October 16, 2007.

<sup>8</sup> Government of Canada, Building Canada, Modern Infrastructure for a Strong Canada, p.2. The Plan included The National Policy Framework for Strategic Gateways and Trade Corridors, a national fund with \$2.1 billion over seven years.

<sup>9</sup> John Brodhead, Jesse Darling and Sean Mullin, *Crisis and Opportunity: Time for a National Infrastructure Plan for Canada, Canada 2020*, Posted October 1, 2014 <http://canada2020.ca/crisis-opportunity-time-national-infrastructure-plan-canada/>

<sup>10</sup> ISTEA was followed by the National Highway System Designation Act of 1995, the Transportation Equity Act for the 21st Century (TEA-21) in 1998 and the Safe, Accountable, Flexible, Efficient Transportation Equity Act of 2005 – A Legacy for Users (SAFETEA-LU) in 2009. And, most recently, the Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012.

<sup>11</sup> See "Intermodal Surface Transportation Efficiency Act of 1991 – Summary" <http://ntl.bts.gov/DOCS/ste.html>

<sup>12</sup> See a 2007 Department of Transportation report: "The inspector general counted 8056 earmarks worth \$8.54 billion within last year's transportation budget. The majority of these, 6556 earmarks, directed the Federal Highway Administration (FHWA) to spend \$5,675,100,200 -- fifteen percent of the agency's 2006 budget -- on projects hidden from public scrutiny in the text of laws, in conference reports and in the reports accompanying the 2005 transportation bill known as SAFETEA-LU. An earmark allows an individual member of Congress to identify a need in his district and bypass traditional federal and state planning procedures. This turns something that might previously have been a low-priority project within the state into a mandatory top priority." Source: Review of

Congressional Earmarks Within Department of Transportation Programs, US Department of Transportation, 9/7/2007

[http://coburn.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore\\_id=85049145-abfo-4af9-83c4-9189944808f7](http://coburn.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=85049145-abfo-4af9-83c4-9189944808f7)

<sup>13</sup> "Trucks carried 64.3 percent of U.S.-NAFTA freight, a 2.2 percentage point increase from 2005, and continued to be the most heavily utilized mode for moving goods to and from both U.S.-NAFTA partners. Trucks accounted for \$359.8 billion of the \$589.9 billion of imports (61.0 percent) and for \$351.9 billion of the \$516.4 billion of exports (68.2 percent...Rail remained the second largest mode, moving 14.9 percent of all U.S.-NAFTA freight, followed by vessel, 6.6 percent; pipeline, 5.2 percent and air, 3.9 percent. The surface transportation modes of truck, rail and pipeline carried 84.4 percent of the total value of U.S.-NAFTA freight flows." Bureau of transportation statistics, [http://www.rita.dot.gov/bts/press\\_releases/bts01716](http://www.rita.dot.gov/bts/press_releases/bts01716) March 18, 2016

<sup>14</sup> Congressman Jerrold Nadler (D-NY) notes that "Although this state-based system addresses state and local surface transportation projects well, it is poorly suited to address critical national transportation projects, such as major freight projects that provide broadly dispersed benefits but high local costs." Angie Schmitt, "Will the Nation's First Strategic Freight Plan be Multi-Modal?" *Streetsblog US*, May 6, 2013 <http://usa.streetsblog.org/2013/05/06/will-the-nations-first-strategic-freight-plan-be-multi-modal/>

<sup>15</sup> Government funding for transportation has become more problematic and often bizarre. This is a good overview of the 2015 legislation. Daniel C. Vock, "A Decade in the Making, Congress Strikes a Deal on Transportation Funding", December 2, 2015, <http://www.governing.com/topics/transportation-infrastructure/gov-congress-highway-transportation-bill.html>. And an explanation of the Highway Trust Fund: Budget Explainer: Highway Trust Fund, Peter G. Peterson Institute, Sep 4, 2014 <http://www.pgpf.org/budget-basics/budget-explainer-highway-trust-fund>

<sup>16</sup> Doug Palmer, "Candidates weaponize free-trade issue," *Politico*, March 12, 2016 <http://www.politico.com/story/2016/03/clinton-hardens-line-against-tpp-trade-deal-220674> Ross Perot in the 1992 election campaign sought to make NAFTA a key electoral issue ("the giant sucking sound...") but didn't get much purchase on this tack.

<sup>17</sup> "Donald Trump says China 'wants our people to starve' and Mexico is 'killing us on jobs'. He has proposed eye-watering import tariffs. Bernie Sanders blames the North American Free Trade Agreement for the loss of almost 700,000 jobs. And in October Hillary Clinton decried the Trans-Pacific Partnership trade deal that she once supported." "Why opposing free-trade agreements is a clever campaign strategy", *The Economist* April 4, 2016

<sup>18</sup> See Shachi Kurl, "Canadians anxious about TPP's effect on jobs: poll, *ipolitics*, January 29, 2016 <http://ipolitics.ca/2016/01/29/the-angus-reid-poll-canadians-anxious-about-tpps-effect-on-jobs/>



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<sup>19</sup> Pew Research Center, Views on economy, government services, trade, <http://www.people-press.org/2016/03/31/3-views-on-economy-government-services-trade>

<sup>20</sup> Nelson Schwartz and Quoc Trung Bui, "Where Jobs Are Squeezed by Chinese Trade, Voters Seek Extremes," New York Times, April 25, 2016

<sup>21</sup> "There is broad agreement with very high confidence that climate change-related extreme weather events damage critical infrastructure, disrupt the food supply, threaten water supplies and increase mortality worldwide." See IPCC, Climate Change 2014: Impacts, Adaptation, and Vulnerability, 2014

<sup>22</sup> Report, National Climate Assessment <http://nca2014.globalchange.gov/report/sectors/transportation>

<sup>23</sup> Transportation Research Board, Potential Impacts of Climate Change on U.S. Transportation, Special Report 290, Washington, D.C. 2008, p.80

<sup>24</sup> Jessica Boyle, Maxine Cunningham, Julie Dekens, Climate Change Adaptation and Canadian Infrastructure; A review of the literature, International Institute for Sustainable Development, November 2013 p.10

<sup>25</sup> U.S. Environmental Protection Agency, Planning for Climate Change Impacts at U.S. Ports, White Paper July 2008 <https://archive.epa.gov/sectors/web/pdf/ports-planing-for-cci-white-paper.pdf>

<sup>26</sup> Austin Becker, David Newell, Martin Fischer and Ben Schwegler, "Will Ports Become Forts?" Climate Change Impacts, Opportunities and Challenges, 2 Terra et Aqua | Number 122 | March 2011 <https://www.iadc-dredging.com/ul/cms/terraetaqua/document/2/9/0/290/290/1/article-will-ports-become-forts-climate-change-impacts-opportunities-and-challenges-terra-et-aqua-122-2.pdf>

## ► About the Author

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