IASP International Association of Science Parks and Areas of Innovation

33rd IASP World Conference on
Science Parks and Areas os Innovation 2016

Russia, Moscow

Detroit and Southeast Michigan - the 21st Century Global Center for Mobility: The Impact of the Ann Arbor Area of Innovation on the New Industries of Connected, Autonomous and Automated Vehicles and the Metropolitan, National and Global Economy

Plenary session

STPs and Areas of Innovation: collective thinking

Author:

Paul Krutko (Paul@annarborusa.org)

Detroit and Southeast Michigan - the 21st Century Global Center for Mobility, USA

Hosted by:

MOSCOW CITY GOVERNMENT · RVC · FASIE · Skolkovo · MSU SCIENCE PARK · technopark STROGINO

Detroit and Southeast Michigan - the 21st Century Global Center for Mobility: The Impact of the Ann Arbor Area of Innovation on the New Industries of Connected, Autonomous and Automated Vehicles and the Metropolitan, National and Global Economy

Executive Summary

A key attribute of the emerging phenomena of areas of innovation (AOIs) as a habitat for knowledge creation, innovation and commercialization of new products and services is that AOIs can act as a platform to spur collective thinking among its quadruple helix constituents. This paper presents the case study of the Ann Arbor SPARK area of innovation that is driving a collective regional and state effort to become a global center of research, development and commercialization of connected and autonomous transportation technologies.

This paper will focus on lessons learned and replicable professional practices that STP and AI leadership can employ - demonstrating the power of the AOI in creating new collaborative platforms where one did not exist before impacting the larger regional economy by making it a living laboratory for the validation and commercialization of new technologies that can be deployed globally for the benefit of the entire world.

Revolutionary Change in Human Mobility

This new era of mobility will dramatically reshape the way we interact with vehicles and the future design of our roads and cities. Technology — both vehicles' connection and their automated features — may create a new level of mobility with safer, more efficient movement of people and goods. This technology has implications for multiple industries (e.g., automotive, insurance, telecom, and technology) and for the governments that are responsible for ensuring that technology is safe for consumers. Numerous trends will help determine the future of the mobility industry, including:

-Expected increases in the population of **urban metropolitan areas** by 2030

-Increases in consumers' expectations of connected, active safety features in new vehicles. More than half of new car buyers said that car connectivity features were a critical purchasing factor, and slightly less than 30 percent prioritize connectivity over features such as engine power or fuel efficiency. A much smaller, hard core group (13 percent) said they would not buy a car that was not connected to the Internet.

-New technologies address transportation concerns and **increase the safety** of drivers, passengers, and pedestrians through **active safety technology**. Advanced Driver Assistance Systems (ADAS) are already making driving safer and more convenient. Blind spot object and pedestrian detection, lane assist, active city safety, active cruise control radar, collision warning with full auto brake, and active park assistance are expected to become more standard over the next six years.

-ADAS is expected to evolve into autonomous driving over the longer-term, which will add even more value to the driving assistance value proposition. By removing human error from the equation, fully autonomous driving promises nearly 100 percent safety and greater commuting efficiency, allowing the person in the driver's seat to do the same things passengers do, e.g., work, read, watch video, or sleep. Ultimately, autonomous driving will allow for the **entire redesign** of the human-machine interface (HMI) and the car's interior layout. Autonomous or semi-autonomous driving could also transform car-related industries through new value propositions and business models in the following realms:

- Mobility services/"car sharing." A new level of massive-scale car sharing/pooling may evolve where you call your car to pick you up or where automated vehicles serve in public transportation. This would lead to a change in the ownership model, as people might not need a car of their own anymore.

- Logistics/industry services. In the logistics industry, autonomous vehicles, such as the autonomous haulage systems used by Rio Tinto, are already a reality. Automation of delivery and pickup services, (e.g., automated package and mail delivery, automated garbage pickup) may become the standard in the future

- Defense. The movement of goods and people is central to successful military operations and the efficient deployment of resources and human lives

- **Reduce energy consumption** through more efficient transportation systems and changes in business models

- Ride-sharing business models may increase vehicle usage and the overall demand on the wireless infrastructure within the United States

- The restructuring of cities as the street and parking are reimaged as far fewer vehicles are necessary and the space those vehicles need to operate and be stored is also reduced.

Ann Arbor SPARK, Areas of Innovation and the Global Mind

Ann Arbor SPARK is recognized as one of the leading "areas of innovation" (AOI) in the United States. This unique entrepreneurial and economic development ecosystem was not in place a mere decade ago despite having all of the core assets that it has today. While this community based area of innovation has impressive metrics...in company formation, commercialization, capital investment and job creation...it is having an even more dramatic impact in transforming the regional economy in spurring collective thinking among private, public, academic and non-profit stakeholders on the future of human mobility in the 21st century for the benefit of the entire world.

Detroit and Southeast Michigan has been the global center of the 20th century automobile based transportation system that transformed the world economy from 1900 to the present. This transformation changed where and how people lived and worked, where companies located along with their supportive supply chains creating the land use patterns that we see all over the world. The impact on land use and the environment has been profound.

In the first two decades of the 21st century, the convergence of advanced IT technologies, as well as new energy, material and advanced manufacturing technologies, all significant clusters in the A2 AOI are creating opportunities for development of new products and services that will have profound social impacts. These opportunities are presenting themselves as answers to global urbanization and need the for direct and immediate action to combat climate change. At the same time, Southeast Michigan is threatened by loss of jobs and investment as other parts of the world become more competitive in their ability to capitalize on their assets and clusters to offer mobility solutions.

The Ann Arbor AOI through research and development, and commercialization and creating of demonstration test beds is creating the opportunity for the surrounding Detroit metropolitan area and the automotive region of the US centered on southeast Michigan to transition to this new era of mobility creating new opportunities for economic prosperity.

This paper will describe how this U.S. version of a multi-dimensional helix; with multi-layers of local and state public actors, private sector interests and strong leadership from a core research university is bringing a dynamic regional economic engine to life and enabling it to become self-sustaining. This collective thinking has resulted in specific catalytic projects:

-the development of Mobility Transformation Center on the campus of the University of Michigan with the ability to test “last mile” technologies,

-the 25,000 U.S. federal vehicle safety pilot the deploys advanced vehicle to infrastructure technologies in the automobiles of ordinary citizens creating substantive real time data on how these systems work in the real world,

-the installation of advanced roadway sensor and optical technologies in a 250 kilometer loop throughout the metropolitan Detroit creating another vast test bed for researchers and companies to investigate new mobility solutions,

-creation of new research and development platforms applying new energy solutions to power train and storage and advanced light weight materials to new vehicle design and configurations,

-and the creation of the American Center of Mobility, a 375 acre testing facility for connected, automated and autonomous vehicle validation and commercialization duplicating all types of road way and land use configurations in a major regeneration project.

The emergence of collective thinking around the future of human mobility in the Ann Arbor AOI and its engagement with the much larger region of Greater Detroit/Southeast Michigan grew out of the underlying organizing principles that the initial stakeholders in Ann Arbor

SPARK had at its founding eleven years ago. These organizing principles are key to our success in creating and growing an area of innovation and having applicability to other regions that are trying to spur the creation of an area of innovation or in existing AOIs that are struggling to achieve relevance. The importance of strong founding principles is that it positions an AOI for effective collective action when new opportunities arise for that AOI to participate in and make significant contributions to the global economy.

Organizing Principles for the A2 SPARK AOI

1- **Build a collaborative leadership network**
2- **Set a vision for growth**
3- **Pursue talent and technology**
4- **Promote inclusive growth**
5- **Enhance access to capital**

This positioning through an engaged collaborative quadruple helix that is in regular communication is the "secret sauce" to an impactful AOI. As the AOI focuses on its day to day work it must do so with in a framework of intentional planning and leadership preparation grounded in the assets of the region. That is the ability of an AOI to foster social innovation and economic impact is grounded in its "terroir". Much like an agricultural terroir, identification and maximum use of indigenous assets by an AOI will result in social innovations that enhance the competitive position of the surrounding region by producing products that are desirable to the global economy or a "great wine".

Creating a 21st Global Center for Mobility – A2 SPARK's Origin as Prologue

The A2 SPARK AOI was an intentional creation of the elements of this region's quadruple helix eleven years ago. The initial impetus was the realization in 2005 by the newly tenured President of the University of Michigan , one of the top three research universities in the US, that the University was having an undersized impact on the local regional and state economy in comparison to its peers like Stanford. This undersized impact was evident in light of the fact that UM was competitive with its peers on almost every other metric. The disconnect between being one of the top three research universities in America and ranking 95th or higher in technology transfer was a call to action. Additional as a public university, it is the one of the missions of the institution **to** have an economic and social impact on its environs.

The university convened a panel of its prestigious alumni who had great success in creating technology companies that had significant societal impacts for humanity as a whole and in the economic success of the communities that the companies had located facilities. These alumni advised the President that a convening collaborative platform was needed **outside** the University with the other elements of the region's quadruple helix to maximize the opportunities from and for the University.

The University then reached out to local and state governments and the significant GDP related companies in the region as well as key non-profit actors and convened a set of organizing meetings that resulted in the creation of Ann Arbor SPARK. A CEO and staff was hired and the organization was stood up in 2006.

From the very beginning to this day, the A2 SPARK AOI is defined as a collaboration between the private sector, the public sector at the local and state level and regional academic institutions. All are represented co-equally on the A2 SPARK AOI board of directors. In its mission statement the AOI is clear that the purpose is to provide an integrated program of interventions to grow a technologically based regional economy and the GDP in the Greater Ann Arbor region. This program would be focused, consistent, intentional, persistent and long term. Underpinning the effort was collective thinking around shared values:

-innovative service,

-open source economic development, and
-regional cooperation

The collective thinking of the members of this quadruple helix collaboration focused on five strategies:

-acceleration of startups and early stage companies to scale
-growth for existing technology based GDP producing companies
-development, attraction and retention of the talent necessary for these companies to be successful
-leadership around key regional issues
-planning for the future success of the area of innovation in a changing global competitive landscape

From those humble beginnings, today A2 SPARK has an annual budget of $5.4 M and a staff of 23 providing direct service delivery and facilitation within and around the AOI.

This intentional collaboration and collective thinking as created a vibrant Area of Innovation with outsized metrics for a community and region of this size as the charts below illustrate:

Business Development

374 project successes - **$1.9 billion** investment commitments.
Leveraged community investments to over
$56.6 million - through Federal and State grants, foundations and other sources.

Entrepreneurial Services

Assisted **1,873 innovation start-ups**

Over **260+** tenants in 2 regional incubators

107 Pre-Seed investments in **99** companies ($238k/company average)

115 Microloans in **103** companies ($44.3k/company average)

Creating a 21st Global Center for Mobility - The Future of the A2 SPARK AOI and Southeast Michigan - Is Mobility the Next Big Thing?

The SPARK platform as described above and the fact that this AOI is not tied to a specific piece of real estate like a science park creates freedom of action to pursue initiatives and activities as opportunities present themselves. This coupled with a budgetary structure where all the members of the triple helix are contributing nearly equally to advance the agreed to strategic plan provides some financial resources to position the organization and the area of innovation to lead and plan. In fact, SPARK does have the ability to pursue strategic planning and leadership initiatives with the third of its budget that is not restricted to a particular purpose or a geography.

It is with these resources that SPARK staff began to investigate the need for and the possibility for a US national level testing and validation facility for connected and autonomous vehicles. This thinking grew out of a burgeoning ITC cluster in the AOI particularly focused on network security, sensors and telematics and the strong research presence of the University in transportation research. It was further bolstered by the strong engineering talent pool in SE Michigan (highest level of per capita in the US) and the fact that SE Michigan has a large pool of ITC talent second only to Silicon Valley in the US.

Staff developed a white paper entitled **"Ahead by A Century — A Proposal to Develop a World Class Test Facility for Intelligent Transportation Systems and Autonomous Vehicles in Southeast Michigan"** that was presented to the SPARK Board of Directors and adopted into the strategic plan. At the same time, staff identified an appropriate site adjacent to the AOI

that required repurposing from its use as a 465,000 square meter factory building located 140 hectometre site. This property called Willow Run was the largest vacant industrial property in the General Motors bankruptcy during the Great Recession in 2008-2009. In its earlier development it was the famous Arsenal of Democracy where B-24 bomber aircraft exited its assembly line fully assembled at the rate of one per hour - a fantastic feat of innovation in the 1940s. This site had significant environment challenges but after demolition it would have a concrete pad over the majority of its surface area as well as access to unused highway speed roadways and ramps which used to serve the 25,000 people that worked there.

Coupling these two ideas, with the strong endorsement of the board of directors, the SPARK staff team began to convene various stakeholders to pursue the development of a global center for mobility.

The first attempt to implement this concept in 2014 resulting in an initial success as one of the academic helix partner grasped the importance and relevance of the opportunity for its own success. The University of Michigan with $10M of its own funds matched by $10M from the State of Michigan built a smaller version of the contemplated version at Willow Run on 30 acres of University owned land. This facility called M-City is the first of its kind purpose built facility for connected and autonomous vehicle research and development. The University was able to attract more than 40 industry partners to also invest in the facility giving them the right to have dedicated time there to implement specific technology development programs. Clearly this was the first success of the A2 SPARK AOI's collective thinking to engage in substantive program to impact the necessary social innovation of human mobility.

M-City

This new facility was an immediate success and has immediately become fully booked. It also

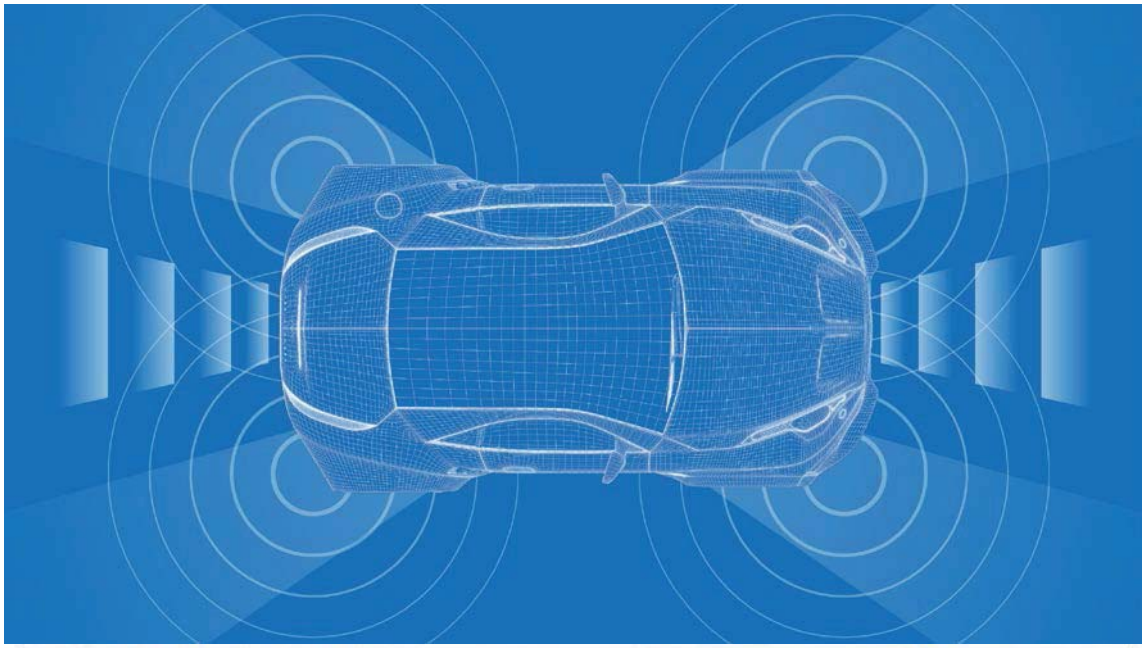
has limitations that highway scale and multiple land use configurations are not available. Additionally, M-City was a university research facility that limited its use to the industry partners that provided funding.

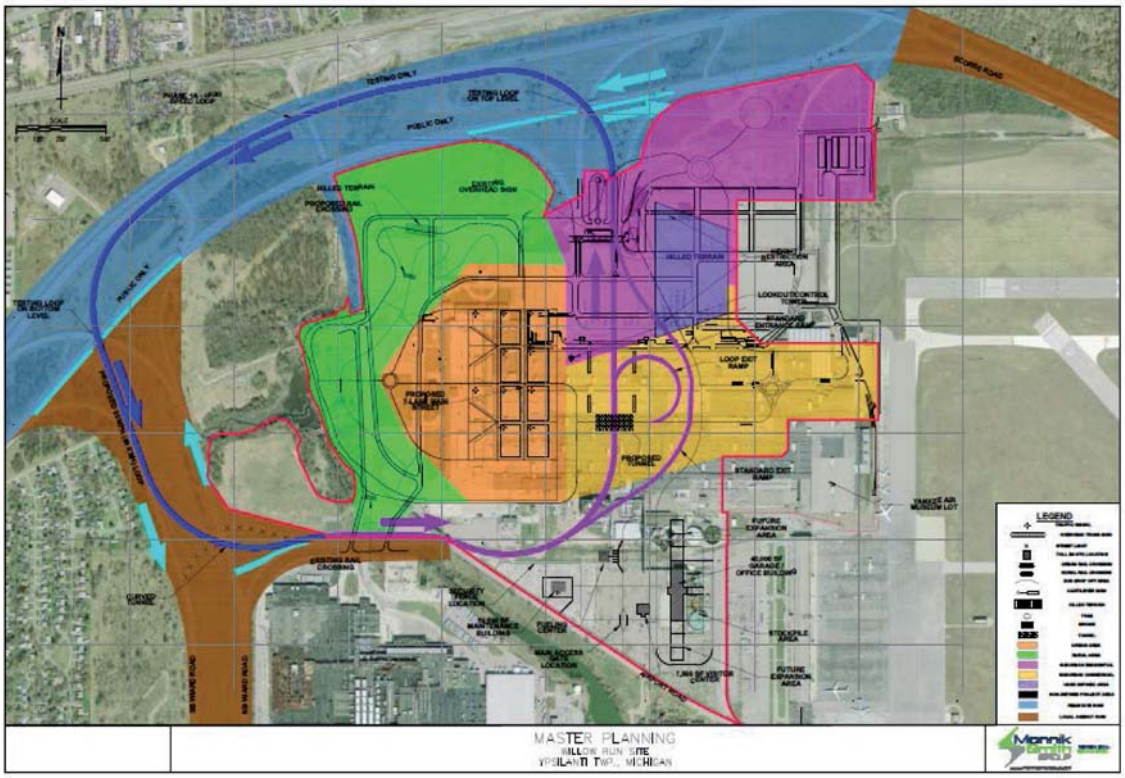
SPARK continued to pursue the larger project by continuing to utilize its quadruple helix platform to inform and convene stakeholders of the opportunity at Willow Run. As a next step, SPARK worked with a private sector development company to take ownership of the property and implement the project on an open source operating model. This approach was worked on extensively throughout 2014, including focus groups with major original equipment manufacturers (OEMs), tier 1 through 3 suppliers and non-automotive technology companies working on mobility solutions that defined and validated the need for the Willow Run facility to enable the industry itself and non-automotive technology companies to effectively collaborate to develop solutions that would have world-wide implications and benefits. When the private developer stepped away from the project, SPARK conceived a alternative non-profit operating model.

This included engaging a widening ring of stakeholders who recognized the power and credibility of the SPARK AOI to advance initiatives of this importance. With the help of local federal legislators, the SPARK team made a number of presentations in Washington DC to departments and agencies in the Obama Administration that touched some aspect of the need to create standards and regulate these new means of transportation. This included key officials in the White House itself. Utilizing the network of private sector members of the SPARK partnership, presentations to the organization of CEOs of Michigan based Fortune 500 led to the support and advocacy for the project by that organization, Business Leaders for Michigan. This collaboration created the opportunity for the SPARK team to present the project to the Governor of the State of Michigan as well as the President of the University of Michigan to obtain their support and direct involvement.

Ultimately this lead to the announcement by the Governor of Michigan in his State of the State address in January 2016 of the state's commitment of $20M toward the acquisition and development of Willow Run and the establishment in March 2016 of the American Center for Mobility as an operating entity with a CEO and staff to implement the project. Interestingly, the SPARK CEO is a board member and Treasurer of this new entity which is indicative of the importance of the SPARK AOI in the collective thinking on taking ownership of connected and autonomous mobility as the region's continuing contribution to the "global mind".

The American Center for Mobility, Willow Run, Ypsilanti Township, Michigan





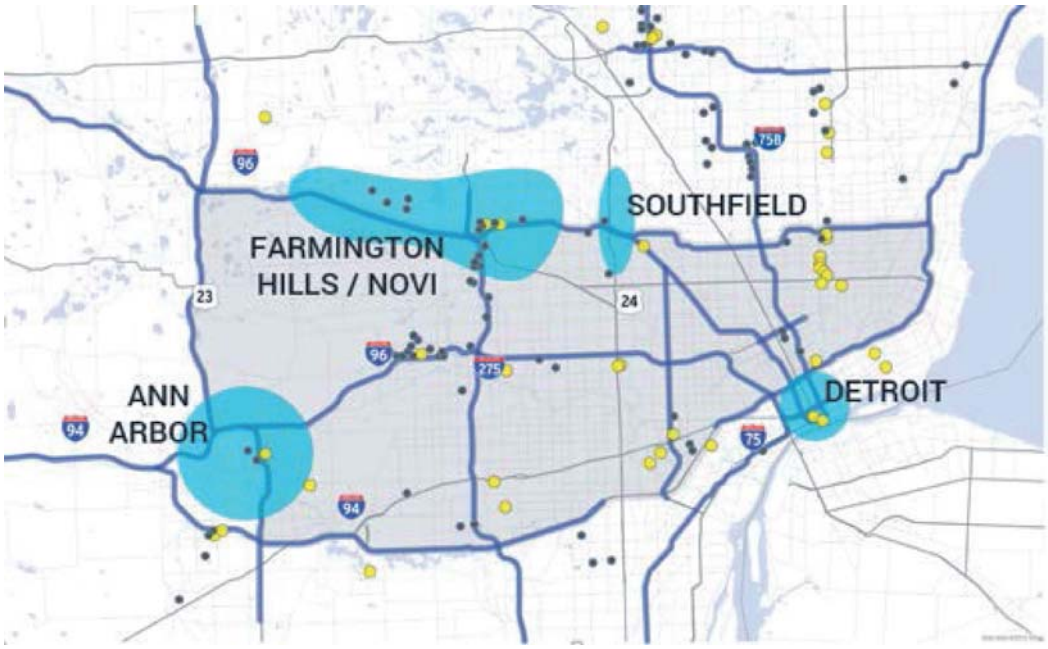
This project is embedded geographically in other initiatives that have significance has test beds for other related aspects of the question of human mobility:

-the 25,000 U.S. federal vehicle safety pilot the deploys advanced vehicle to infrastructure technologies in the automobiles of ordinary citizens creating substantive real time data on how these systems work in the real world,

-the installation of advanced roadway sensor and optical technologies in a 250 kilometer loop throughout the metropolitan Detroit creating another vast test bed for researchers and companies to investigate new mobility solutions,

-creation of new research and development platforms applying new energy solutions to power train and storage and advanced light weight materials to new vehicle design and configurations.

The Detroit-Ann Arbor Regional Connected and Autonomous Vehicle Test Beds



Conclusion

The purpose of this paper was to illustrate the power of intentionally designed areas of innovation with an organization platform at the heart of the effort convening and informing the participating members of the quadruple helix in creating innovation solutions and social impact. Such an organization, through asset mapping and future focused thinking, can identify opportunities for the area of innovation and its surrounding region to participate more fully in the global economy and contribute to the "global mind" through the innovations it spawns.

The evolving case study of the Ann Arbor SPARK area of innovation and its strong contribution to creating a new center of research and development of global mobility solutions in real world test beds was presented. Lessons learned from this case study are that science and technology parks and areas of innovation that are engaging their stakeholders in collective learning can through leadership engagement and planning have dramatic impacts on the economic potential and future of their surrounding regions and the world.

Sustained success comes from working to create the collaborative platform ahead of opportunities so that it is ready to respond quickly and not have to be reinvented each and every time an opportunity presents itself. The convening power and resource availability to explore opportunities in a focused, consistent, intentional and persistent approach focused on the long term will be one of the most significant contributions of areas of innovation to social innovation and social impact and furthering the Global Mind as nodes in the worldwide innovation network.