Report on a Research and Development Inventory Effort for the Commonwealth

June 2020

VIRGINIA RESEARCH INVESTMENT COMMITTEE

Table of Contents

EXECUTIVE SUMMARY

A state-level R&D inventory is a mechanism to catalog a state's research strengths and corresponding assets, which can include equipment and faculty research endeavors, among other topics. The Commonwealth possesses abundant and diverse R&D assets but no central, coordinated mechanism to catalog these strengths. The development of this report amidst a global pandemic further elucidates the importance of such a catalog on many fronts: from limited resource appropriations, to objective research bench strengths and identification of experts engaged in related and complementary activities.

The Commonwealth Research and Technology Strategic Roadmap (the Roadmap) offers options of what an R&D inventory could include but does not formally establish a process to maintain such a catalog. Fulfilling a statutory requirement of the Roadmap, this report serves to establish a process for maintaining an inventory of the "Commonwealth's current research and development endeavors in both the public and private sectors that can be used to attract research and commercialization excellence in the Commonwealth."

In December 2019, the Virginia Research Investment Committee (VRIC) expressed the need and support for an inventory and charged SCHEV with obtaining stakeholder input on establishing an inventory process, including findings and recommendations to conclude with a formal report. VRIC requested the report on establishing an R&D inventory effort by their June 2020 meeting.

This report incorporates SCHEV research on model inventories from other states from which the Commonwealth can learn, input from higher education, economic development and industry stakeholders along with guidance from the research and development inventory advisory committee established to assist with this project.

Summary of Findings

Common themes from SCHEV research and input from stakeholders focused on the need for an R&D inventory, potential uses for the inventory, along with scope and scaling of the R&D inventory effort to include funding strategies and return on investment metrics. Core themes are summarized below.

- External uses/needs for an R&D inventory: To identify points of contact, available equipment, expertise, programmatic resources, top research areas and corresponding assets. This includes information an external (public) user can access.
- Internal uses/needs for an R&D inventory: Benchmarking within and across institutions and the state, objective assessment and identification of potential collaborators. This includes information an internal user can access.
- Inventory scope: An inventory should focus on breadth of content versus depth.
- Inventory scale: Consider core focus areas (Roadmap) with the ability to drill down to additional details from those areas.
- Return on Investment: Demonstrating use and impact is critical to success and sustainability of such a resource. Establishing performance metrics and reporting on those impacts will support continued funding.

Summary of Recommendations

The seven-member R&D inventory advisory committee reviewed common and divergent stakeholder input and derived the following recommendations. The R&D inventory should:

- Serve multiple uses (industry, economic development and higher education) beyond statutory requirements.
- Possess different publicly- and internally-facing components in order to best meet the needs of multiple types of users. AND

- Demonstrate use and prove value/return on investment. The committee discussed a process to launch an initial, limited-scope pilot followed by assessment and scale up accordingly.

SCHEV Council approved the report in May. Pending review and approval of the report by VRIC in June, the final document will be conveyed to prior recipients of the Commonwealth Research and Technology Strategic Roadmap as well as the Center for Innovative Technology per transition to the Virginia Innovation Partnership Authority in July. Steps to implement this process are included in the report and most immediately concern identifying the entity that will lead implementation.

INTRODUCTION

in·ven·to·ry**:** an itemized list of current assets (source: Merriam Webster Dictionary).

The Commonwealth of Virginia benefits from many diverse and strong research and development assets and capabilities. However, no central repository exists that catalogs these various assets. Having such an inventory available publicly would aid higher education, private industry, economic development and policy interests in specific and important ways. The research and development inventory effort focuses on establishing a process to maintain such a catalog. This effort builds on and from high-level inventory input provided in the Commonwealth Research and Technology Strategic Roadmap (the Roadmap). The statutory goal of the inventory is to "attract research and commercialization excellence to the Commonwealth."

The research and development inventory effort lays out the process for establishing and maintaining a catalog of the Commonwealth's research and development assets (these can be human and physical). The effort focuses on the needs and potential uses for the inventory – using that input to derive proper scope and scale for the endeavor. Such focus is critical to ensure the end product is something that is not only used but has demonstrated impact.

This report provides an overview of the effort, its context within the Commonwealth Research and Technology Strategic Roadmap along with common themes from stakeholder input and recommendations made by an established advisory committee, the State Council of Higher Education for Virginia (SCHEV) and the Virginia Research Investment Committee (VRIC).

CONTEXT AND PROCESS

Why an Inventory?

To identify the need for such a catalog, consider the types of questions an R&D inventory could answer for the Commonwealth, for industry and for higher education. During this unprecedented time relative to COVID-19, answers to these questions are particularly noteworthy. Policymakers and officials might ask which faculty in Virginia have expertise in infectious diseases, public health epidemiology, vaccine research or immunotherapy. If those questions were asked today, each individual company in Virginia and higher education institution's website would be scoured for this information. Most of that information would be housed in different places within multiple websites, using different terminology with varying details relative to points of contact and useful information. Simply put, it would be an hours long exercise at best. Imagine if instead, state researchers could run a 60-second query that identified key researchers and experts in these areas that could then be quickly contacted and plugged into key testing, task force or recovery efforts.

Taking another use case, during the Commonwealth's budget cycles and specific appropriation requests, an inventory could aid in assessing higher education research funding requests helping to make "apples to apples" comparisons. An inventory tool or platform could identify complementary or divergent foci of the requests; synergies could be more easily identified, reducing duplication of efforts while offering the potential for collaboration between institutions where and when it makes sense.

A final example pertains to start-ups. A lean start up needs non-routine access to a mass spectrometer. If that need exists today, the company would either need to reach out to any existing contacts it has at a given university or start blindly contacting various labs and faculty to ascertain availability and terms of use. Each institution would likely have different points of contact and legal terms for such equipment use. Streamlining this process would assist industry with their needs "at the speed of business" which also offers the ability for businesses and higher education to interface and spur further collaboration.

Right now in the Commonwealth, these scenarios play out differently; no central repository exists for this type of information. A void also exists relative to showcasing the Commonwealth's research and development strengths on a comprehensive statewide basis. A tremendous amount of groundbreaking work occurs within Virginia but aside from individual institutions or entities highlighting their news, there is no central place to highlight Virginia's research endeavors and commercialization activities. To continue to attract and grow such excellence, some level of outreach and messaging on existing assets must ensue. A statewide research and development inventory has the potential to address any and all of the above needs and more. The following sections provide additional context for an R&D effort in the Commonwealth.

Strategic Roadmap

In 2019, SCHEV developed the Commonwealth Research and Technology Strategic Roadmap, as part of its statutory obligation. The Roadmap serves to identify research areas worthy of institutional, economic development and private sector focus. The Roadmap's goal is to create a framework for fostering collaboration between higher education, private sector industry and economic development around those identified research areas of focus.

One of the statutory requirements of the Roadmap is to "establish a process for maintaining an inventory of the Commonwealth's current research and development endeavors in both the public and private sectors that can be used to attract research and commercialization excellence in the Commonwealth." The roadmap offers many options for what an inventory can look like but does not formally establish an inventory process. Some inventory options identified by higher education, economic development and private sector stakeholders through the Roadmap development process are summarized below. For additional information, refer to Appendix A at the end of this report.

Research Inventory Options for Collaboration
Develop a portal and identify equipment, biorepository, core labs and other assets for sharing/use. Connect with relevant, existing sites and buildings inventories.
Develop an inventory portal of statewide available technologies and intellectual property (IP).
Explore state purchase and licensing of a research, development and commercialization inventory web-based platform.
Create a comprehensive and cohesive research and development inventory. This would enable identification of faculty by area of focus and research activity along with available IP, shared equipment, clinical trial information and startups.

These high-level inventory options show just how broad or narrow the scope of an R&D inventory can be. The scope of the inventory in turn influences use and ultimately return on investment which warrants continued support for an inventory system. In other words, the entire feedback loop for such a system must be considered at the onset of establishing an inventory process.

Virginia Research Investment Committee

In December 2019, VRIC members weighed in on establishing an inventory process. The committee supported the need for a research and development inventory of some sort. VRIC charged SCHEV with obtaining stakeholder input, researching various inventory systems that exist in other states and reporting on findings and recommendations for establishing a statewide R&D inventory. The committee requested updates and a draft report by the June VRIC meeting. Input from the committee will be incorporated into the final report.

R&D Inventory Case Studies

Over the past 18 months as part of the Roadmap development process, SCHEV identified and assessed a variety of R&D inventories implemented by other states. Appendix B provides a list of various "model" inventories from other states along with detailed insight on those models relative to scope and use. A few noteworthy points emerged from this research.

The R&D inventory landscape has changed substantially over the last 18 plus months. Many of the "best in class models" two years ago have now become obsolete. Other states that

launched inventory platforms during that same time now migrated their once internally developed and managed efforts to vendor platforms. SCHEV's analysis identified three critical components to an inventory effort:

1. Automated, scrapable public data. This requires significantly less verification time and human factor errors in manually updating any data. Such data also imposes a level of uniformity – creating a clean method to query various data points.
2. Outreach and awareness. In order to promote use and demonstrate impact, successful inventories not only have an outward marketing component but must also be marketed to potential users such as economic development, higher education institutions and private sector businesses. How entities may use an inventory varies widely by state and respective inventory system. States with successful inventory systems provided outreach at the onset to raise awareness and increase use of their respective inventories. Such efforts cannot be understated.
3. Impact. To demonstrate return on investment, inventories must be used and through that use, impact must be documented and conveyed. Impacts can include quantitative and qualitative components. For example, how many times a unique user accesses the inventory, time spent in the inventory and data accessed. Quantitative impacts could also include use of available lab and research equipment, number of industry/higher education collaborations, increased research funding and more. Qualitative impacts might identify a specific partnership or collaboration that came about from inventory use and how such relationships resulted in an innovation, discovery or some other tangible outcome. Methods and metrics to determine impact should be defined when establishing a statewide inventory process.

The following chart summarizes a few of the inventory models assessed. Details about each state inventory can be found in Appendix B.

State Model	Inventory Scope
Florida ExpertNet	Experts, speakers, projects, research centers/institutes, technology and licensing, innovation exchange.*
Georgia Research Alliance	Eminent scholars, portfolio companies, core facilities, publications and featured breakthroughs.
University of Missouri System	Experts, publications, grants, clinical trials, patents, awards.

Michigan Corporate Relations Network	Experts, research grants, publications, clinical trials, patents, industry and researcher networks.
Ohio Innovation Exchange	Experts, equipment, patents, services and innovation exchange.*

*Innovation exchange platforms offer customized matchmaking and assistance between the private sector and higher education research faculty for collaboration.

Virginia Higher Education R&D Inventories

A few of Virginia's higher education institutions possess some sort of portal or system to track faculty research activity. These efforts are not consistent within or between institutions. For example, not all research efforts within an institution may be documented and the scope of information varies from institution to institution. Some of these inventories may only be accessed internally. Below is a listing of Virginia institutions' existing efforts. These portals along with institutions' websites can provide a backbone of scrapable data and a potential framework from which to build a statewide R&D inventory. Additionally, several institutions subscribe to specific data platforms to gauge faculty activity. Compiling a statewide inventory offers an economy of scale versus individual institutions incurring separate costs for this information without access to data across institutions.

Virginia Tech LINK (internal)

University of Virginia 3 Cavaliers

Stakeholder Outreach

As part of the R&D inventory effort, SCHEV reached out to roughly 25 stakeholders/groups and potential inventory users for input on a core set of questions.

Core interview questions:

1. Need. What are the needs driving the inventory? What questions can/should the inventory answer for higher education, business, and economic development? Policy makers?

2. Use. Who will use this and what is their lens? How will they use it? How frequently do they anticipate using it? What activities and decisions will it inform?
3. Scope. How narrow or broad (all encompassing) should the R&D inventory be? What types of information should be included?
4. ROI. How will success be defined and demonstrated?
5. Sustainability. Offer ideas on potential funding mechanisms to ensure sustainability.

SCHEV requested input from the following stakeholders/groups within the Commonwealth:

- Higher education institutions;
- Federal research labs;
- State economic development entities;
- Entrepreneurial resource centers;
- Regional technology councils;
- Private industry (startups to large corporations); and
- Chief research officers, faculty, entrepreneurs, technology transfer experts, researchers, business leaders/executives and economic developers.

Advisory Committee Formation

SCHEV established a research and development inventory advisory committee to weigh in on emergent themes from stakeholder interviews and offer recommendations for establishing a R&D inventory process. The advisory committee members represent a cross section of R&D interests in the Commonwealth and possess a core understanding of R&D inventories. Committee representation included higher education, economic development, the private sector and federal research entities.

The committee members individually provided input on the core interview questions. Once all stakeholder outreach was complete, the committee convened on March 2 to review and discuss emergent themes and to achieve committee consensus on the use(s) of the inventory, scope and scale.

COMMON THEMES

Stakeholder response to the R&D inventory questions posed during individual interviews revealed common and divergent themes noted in the subsequent sections.

Inventory Uses and Needs

Framing question: Who will use the inventory and how will they use it?

	Access Available Equipment/Expertise	Assess R&D Strengths	Identify Programmatic Resources	Identify Potential Collaborators	Identify Intellectual Property
Higher Education	X	X		x	x
Industry	X	X	X	x	x
Economic Development	x	X	X		

X = common themes from collective stakeholder input.
x = divergent themes from collective stakeholder input.

Access to available equipment and/or expertise: Laboratory and research equipment available for use by other institutions or business. This may also include biorepositories and space available for businesses to lease.

Assess R&D strengths: An objective means to identify Virginia's and its respective higher education institutions' true research capabilities and strengths. This should focus on a short bench of strengths supporting research excellence not a mere listing of overall research activity. Simply put, in what research areas does Virginia lead or have a competitive advantage?

Programmatic resources: This may include identification of subject matter experts, high-level identification of faculty research activity, associated courses or academic programs as well as graduate research students associated with a particular lab/faculty member.

Collaboration: The ability to identify researchers and faculty performing complementary research that opens the door for potential collaboration.

Intellectual property: Patent activity associated with a researcher, faculty member or other individual. This serves to identify complementary technologies and to bundle IP, enhancing overall portfolio value.

Emergent themes from input centered on using an R&D inventory to identify and obtain access to available lab equipment, space or facilities; objectively assess R&D strengths within the Commonwealth and specific institutions and to identify programmatic resources. Programmatic resources include subject matter experts, faculty research activity and associated assets (graduate students, labs, institutes etc.).

Framing question: What questions should the inventory help answer for higher education, industry and economic development?

Stakeholder Type	Input - Questions the inventory should answer
Higher Education	1. **Who is engaged in relevant research in Virginia and might be interested in collaborating?** 2. **What research/testing equipment, lab space, core facilities are available, and who do I contact to gain access to them?** 3. What companion technologies have I not considered as being relevant to my research or commercialization efforts? 4. What related IP can I bundle with my IP to improve portfolio value?
Industry	1. **What research/testing equipment, lab space, core facilities are available, and whom do I contact to gain access to them?** 2. **Where can I find technical talent (graduates and faculty) to improve my product and grow my business?** 3. **How can I identify potential collaborators or subject matter experts?** 4. What related technology under development can improve my product's functionality? 5. What technologies are available to license?
Economic Development	1. **What programmatic resources and expertise are available relative to a specific industry?** 2. **What are Virginia's top research areas?** 3. Where can I find a list of research assets related to a specific industry or focus area for existing or prospective clients? 4. How can I identify institutional and other resources for startups to leverage in the state or a specific region?

Common responses.
Infrequent/divergent responses.
Sourced from questions provided by various stakeholders.

Questions the inventory should answer focus on available lab equipment, space or facilities; objective R&D strengths within the Commonwealth and specific institutions as well as associated programmatic resources.

Inventory Scope and Scale

Framing question: How narrow or broad should the R&D inventory be?

Stakeholders from industry, higher education and economic development largely emphasized the need for inventory breadth versus depth. The inventory should serve multiple uses in addition to the statutory use of attracting research and commercialization excellence. The common uses identified: available equipment and lab space; R&D strengths and programmatic resources as well as the statutory aspect of attracting excellence comprise a potentially broad scope.

From a depth perspective, all users conveyed the need to quickly obtain key information as well as proper points of contact for further details. A divergent opinion expressed by industry conveyed the need for one point of contact to assist with their needs instead of requiring them to perform detailed, independent searches. Innovation exchange platforms from the University of Florida and Ohio use this model, offering custom assistance to business essentially performing the necessary legwork and searches on their behalf.

Framing question: What types of information should be included?

An emergent theme focused on sourcing from available public data via existing databases, spreadsheets and web-based data feeds. This too focused on breadth over depth with high-level information as a priority. Emphasis on available equipment, objective research strengths or researchers/experts including their associated patents, awards, programs and labs/institutes as well as points of contact instead of an exhaustive list of individual publications, citations or coursework or extensive details about available equipment. Additional details can be obtained via the identified point of contact. Stakeholders indicated the importance of identifying the right point of contact and sufficient summary information

in as few steps (or clicks) as possible. The inventory should source from data that requires little if any validation and automated updates.

Scale

The inventory should include an array of research areas not just limiting to one or a few. An efficient and clear taxonomic structure to the inventory is critical for ease of use; stakeholders referenced the Roadmap's six research areas of focus as a potential taxonomy backbone with the ability to query more specific areas from those foci. Addition input referenced the benefit of including all higher education research such as from liberal arts, perhaps as a phase two, to lend credence to those research activities and assets as well.

Return on Investment and Sustainability

Framing questions: How will success be defined and demonstrated? What potential funding mechanisms should be employed to ensure sustainability?

Those interviewed tended to address both questions simultaneously, acknowledging the relationship between the two topics – return on investment and sustainability. The inventory process should include metrics to measure success – use and impact - reporting on such metrics will in turn support sustainability. Suggested metrics to measure use and impact included the following.

- Equipment and lab use;
- Collaboration resulting in new grant funding and research outputs;
- Improved human condition resulting from R& D activities via marketing and success stories;
- Eminent researcher activities such as awards, clinical trials, IP and startups; and
- Inventions and successful matches via technology licensing and bundled IP.

Many of the above metrics may not derive solely from use of the R&D inventory. However, reporting on these and/or other established metrics gives credence to the R&D inventory.

Annual methods of reporting on those uses and impacts will support sustainability. Lack of clear and adequate metrics have imperiled R&D inventories from other states.

Stakeholders offered three primary and divergent funding mechanisms:

- Revenue generation via inventory use.
- Cost-sharing among primary entities using the resource.
- Shouldering the financial responsibility solely by the Commonwealth.

A few additional insights from other state R&D inventory models are highlighted below and should be considered when determining funding sources for the Commonwealth's R&D inventory effort.

- State internal development of an inventory platform can generate large up-front costs and ongoing maintenance and update costs. Both up-front and ongoing maintenance fees can be substantial depending on the scope of the inventory and automation of data feeds and updates.
- Sourcing via existing commercial platforms will generate minimal up-front costs and annual platform subscription fees. These fees include built in updates, patches and data feeds. Ranges for such platform subscriptions vary widely.
- Specific points of contact from one or multiple entities will likely devote time to promoting use and reporting outcomes. This also includes personnel involved with any innovation exchange capabilities of the inventory- offering matchmaking and customized business assistance. Such time can generate additional personnel costs and should be factored into the budget.
- State sponsored inventories have struggled to demonstrate sizable impacts necessary to secure follow on funding compared to cost-sharing counterparts.
- Some states have obtained grant funds to seed R&D inventory efforts. Once the grant funding ends, states have been reluctant to provide follow-on funding to continue the efforts.

RECOMMENDATIONS

SCHEV presented common themes and findings from stakeholder interviews to the R&D inventory advisory committee at the March 2 convening. The committee discussed these themes and developed the recommendations outlined below.

1) **The R&D inventory should serve multiple uses beyond the statutory use of "attracting research and commercialization excellence to the Commonwealth." These uses should address higher education, private industry and economic development needs to:**

   - *Access available research equipment, labs and other space;*
   - *Quantify research bench strengths by institution and Commonwealth-wide; and*
   - *Identify subject matter experts. Data includes high level, scrapable data on research funding, activities, IP, startups and associated programmatic resources. Programmatic resources can include research labs, core facilities, centers of excellence, corresponding graduate programs/courses.*

2) **The inventory should demonstrate use and prove value/return on investment via launch of an initial, limited scope pilot inventory. The pilot inventory will consist of one primary research focus area based on the Commonwealth Research and Technology Strategic Roadmap and will address the multiple uses identified in the first recommendation.** The pilot will validate use and enable adjustments to the platform data, presentation and scope (depth and breadth) before launching the full-scale inventory. The committee expressed that this allows an efficient means to test the inventory framework and demonstrate early use and impacts to shore up support for the full-scale effort. The group offered cybersecurity (including the Commonwealth Cyber Initiative) as a potential pilot focus.

3) **The inventory should include more breadth of information (to include proper points of contact for further information) versus depth on various topics.** For example, high-level (scrapable) data on available equipment, research centers and faculty activity (IP, funded

projects, graduate students etc.) query-able by research focus area and by institution. Such a balance of breadth vs. depth will most effectively serve a variety of users.

4) **The inventory should possess different publicly- and internally-facing components in order to meet best the needs of multiple types of users.** For example, a public-facing inventory could dually serve a marketing function (for industry, economic development and higher education) while the internal components could assist the state and higher education with benchmarking R&D activities by areas of focus and by institution – serving as an assessment tool. Additionally, the platform should function differently for businesses offering a point of contact at each higher education institution to assist with individual needs. The platform can also offer businesses a means to query the inventory directly if they so choose. How different users (internal vs. external) access the inventory should inform its funding mechanism. Internal users can access additional details and "back end" reports and for such privileges may be required to pay for these capabilities via a membership or pro-rata subscription.

NEXT STEPS

The critical next step is to determine the entity responsible for implementing this effort. This report offers guidance for implementation. Once a lead entity assumes responsibility, the following steps should take place.

1. Develop an inventory implementation work plan including timeline, key milestones and staff responsible for delivery.
2. Identify appropriate internal and external contacts/options for inventory development to ballpark costs including a pilot.
3. Determine whether a pilot or full-scale inventory should be launched based on ballpark costs for both options.
4. Draft a budget including any personnel costs, outreach costs and recurring costs over the next 2-5 years for planning purposes. This may include two budgets – for a pilot (if applicable) and for the comprehensive inventory.
5. Produce a request for proposals (if outside platform vendor desired) and follow necessary state procurement guidelines related to such.
6. Select vendor via state approval process if commercial platform desired OR work with appropriate internal staff to develop and launch platform following prescribed work plan.

ACKNOWLEDGEMENTS

SCHEV and VRIC extend sincere gratitude to all of the participants from higher education, industry and economic development for their perspectives on this endeavor. In particular, SCHEV and VRIC want to recognize the following Research and Development Inventory Advisory Committee members for their time and thoughtful recommendations that serve as the foundation for implementing a statewide R&D inventory:

1. Dr. Deborah Crawford, Vice President for Research, Innovation and Economic Impact, George Mason University;
2. Dr. Keith Holland, Vice Provost for Research and Scholarship, James Madison University;
3. Nathalie Molliet-Ribet, Vice President of Research, Virginia Economic Development Partnership;
4. Nick Pesce, Senior Strategic IT Advisor, MITRE Corporation;
5. Nancy Vorona, Vice President Research Investment, Center for Innovative Technology;
6. Dr. Drew Weisenberger, Chief Technology Officer, Thomas Jefferson National Accelerator Facility; and
7. Dr. William Wasilenko, Vice Dean for Research, Eastern Virginia Medical School.

APPENDICES

Appendix A: Research Inventory Excerpts from the Roadmap

The Roadmap statute requires establishment of a research and development inventory. After completion and approval of the Roadmap, and consistent with existing code requirements, SCHEV will follow a similar process to develop the research inventory.

The scope of an inventory can vary widely. The implementation of an inventory can also inform future roadmaps and areas of focus for the Commonwealth as well as tie into and support the other core categories of options for collaboration.

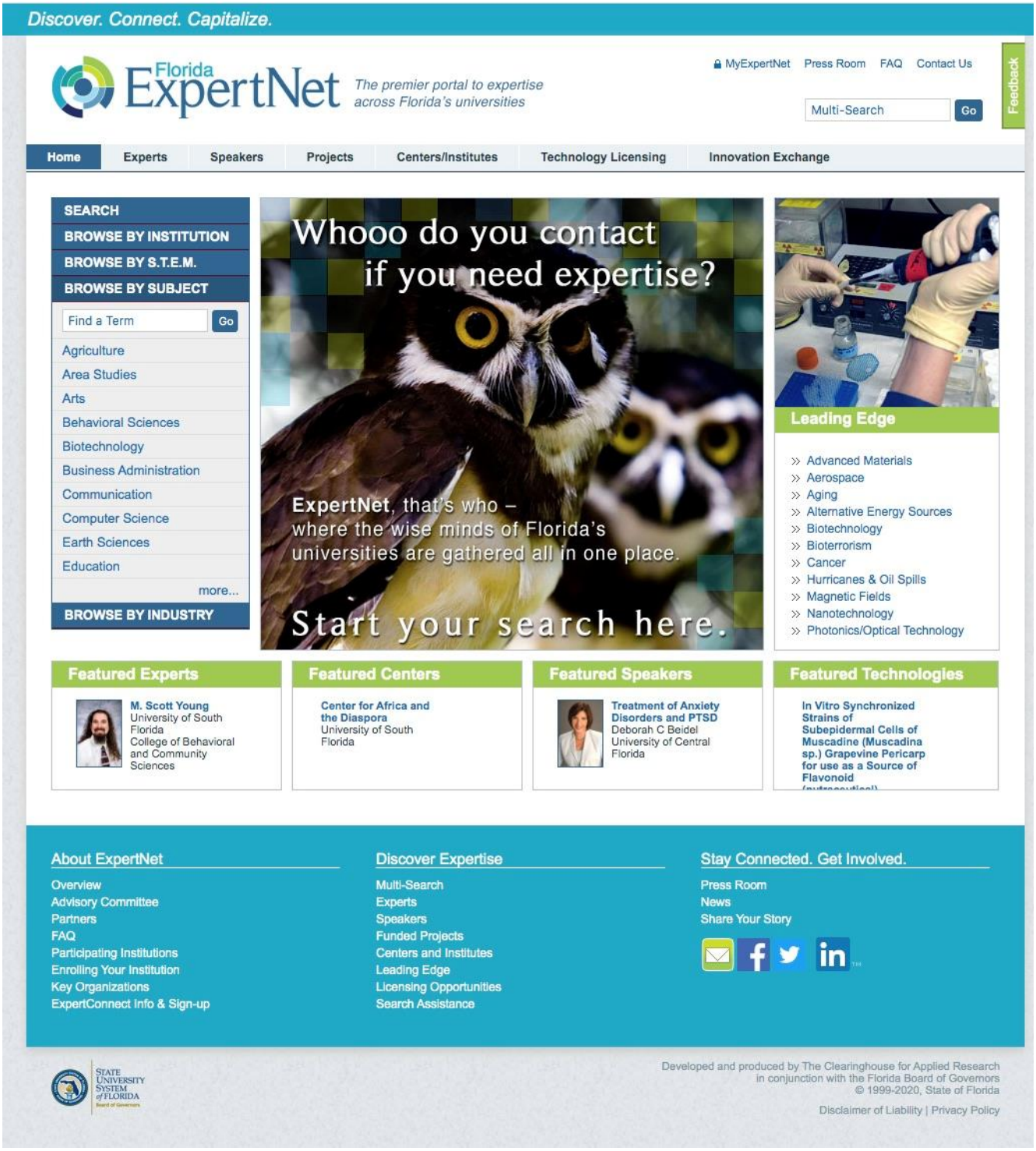
Research Inventory Options for Collaboration
Develop a portal and identify equipment, biorepository, core labs and other assets for sharing/use. Connect with relevant, existing sites and building inventories where appropriate. • The Virginia Catalyst has already begun this effort via a memorandum of understanding with various higher education institutions. The inventory could build on this work and broaden the scope. • The portal could also list state authority-owned properties – for flex, lab, wet lab and other space for startups. One model mentioned is George Tech's Advanced Technology Development Center.
Develop a portal of statewide available technologies and IP. • This can build up over time and focus initially on roadmap sectors. • Additional use as an industry attraction tool. • Refer to economic development and commercialization Roadmap sections for more information. • Explore state purchase and licensing of a research, development and commercialization inventory web-based platform.
Create a comprehensive and cohesive research and development inventory. This would enable identification of faculty by area of focus and research activity along with available IP, shared equipment, clinical trial information, associated startups and a marketing component. For this tool, clear, uniform taxonomy is essential for use. • Georgia Research Alliance is a commonly reference model. • Implementing a comprehensive approach (the entire above plus "site miners" or human components to facilitate engagement and ease of use). Extremely time and cost intensive. Ohio Innovation Exchange is such a model. • Academic Analytics, Wellspring, Digital Science, Reed Elsevier and others offer robust inventory platforms. Crunchbase by Wellspring offers investor-scouting capabilities and market research for associated startups.
Provide dedicated resources to develop the research and development inventory.

Appendix B: Model R&D Inventories from other States

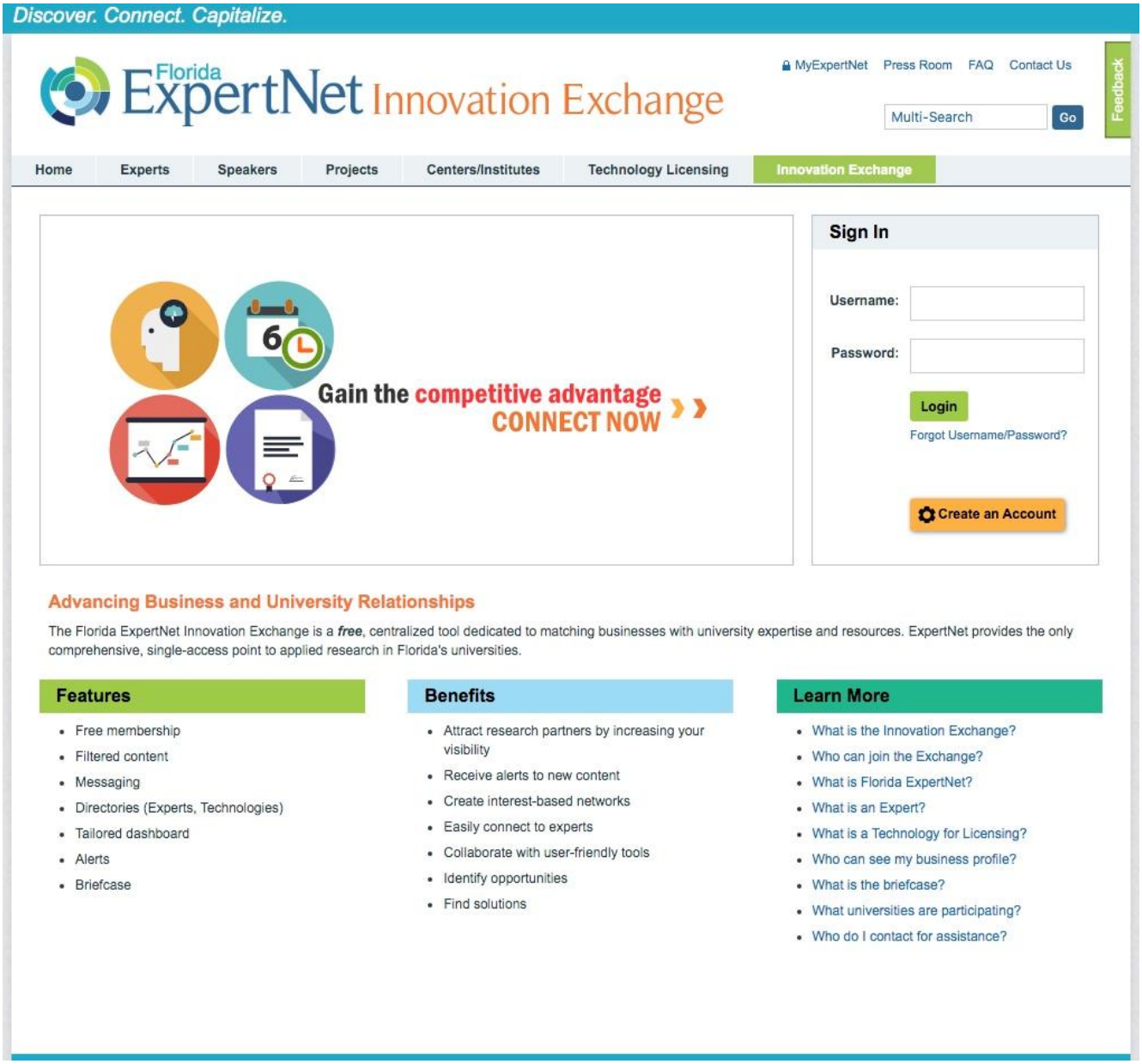
State Model	Inventory Scope	Platform Development	Funding Source	Additional Notes
Florida ExpertNet (est. 1999)	Experts, speakers, projects, research centers/institutes, technology, licensing, postsecondary instructional programs, and innovation exchange. * Platform includes Leading Edge section devoted to high priority areas of research.	Produced through Clearinghouse for Applied Research. Operated by the Center for Information Management and Educational Services at The Florida State University.	State University System of Florida.	Florida ExpertNet Advisory Committee meets quarterly to guide staff on marketing and use strategies. Committee includes economic development, higher education and industry representation.
Georgia Research Alliance (est. 1990)	Eminent scholars, portfolio companies, core facilities, publications and featured breakthroughs.	Internally developed by Georgia Research Alliance.	Operational funding through industry and foundation contributions to the Alliance.	Includes staffing for marketing and communications.
University of Missouri System (portal est. 2019)	Experts, publications, grants, clinical trials, patents, awards.	Platform developed by Academic Analytics.	University of Missouri system.	
Michigan Corporate Relations Network (est. 2011; portal est. in 2019)	Experts, research grants, publications, clinical trials, patents, industry and researcher networks.	Platform developed by Wellspring.	Michigan Economic Development Corporation Entrepreneurship & Innovation Initiative.	Platform offers visualization tools identifying collaborative networks by research area. MRCN also offers a small business internship award.
Ohio Innovation Exchange	Experts, equipment, patents, services and innovation exchange. *	Internally developed by Ohio Manufacturing Institute.	Led by Ohio Dept. of Higher Education in collaboration with four Ohio universities and industry support from Ohio Manufacturing Institute.	Offers case studies and also different means to navigate based on the type of user (industry, higher education, etc.)

*Innovation exchange platforms offer customized matchmaking and assistance between the private sector and higher education research faculty for collaboration.

Florida ExpertNet

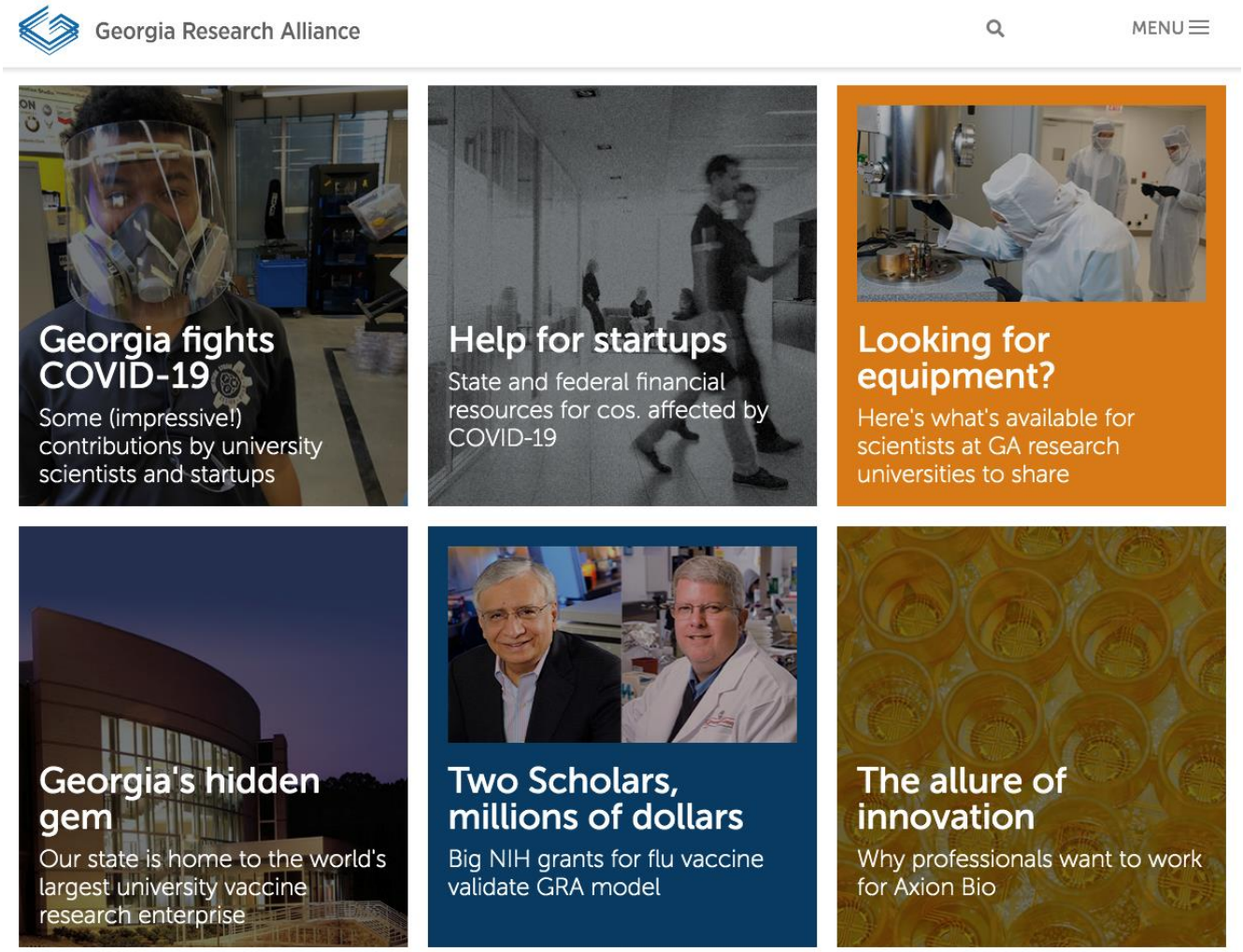


Source: [Florida ExpertNet]



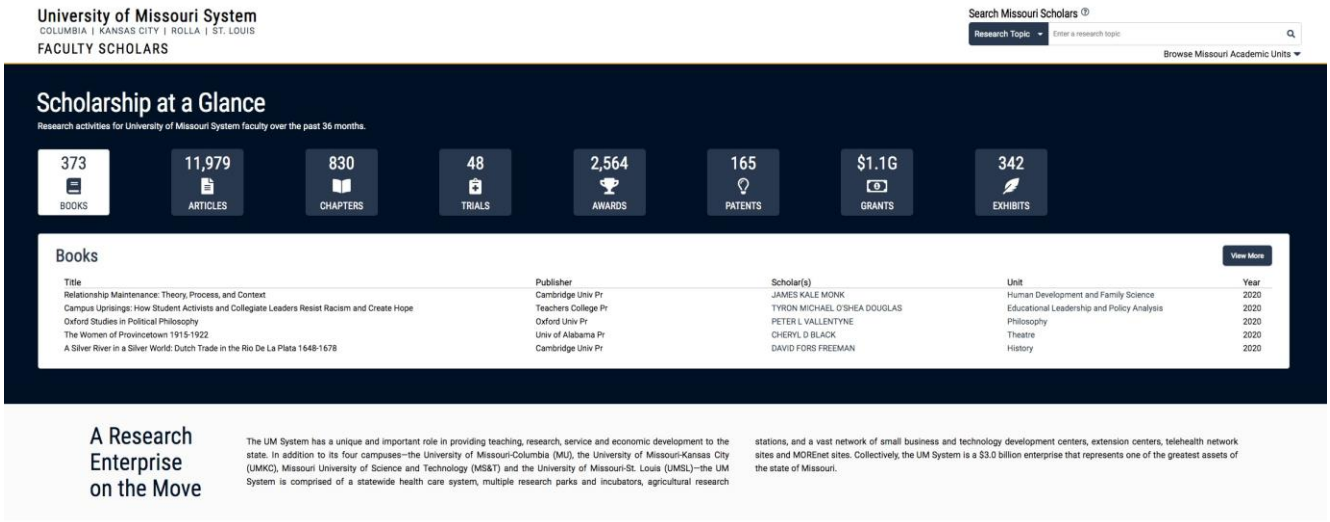
Source: [Florida ExpertNet]

Georgia Research Alliance



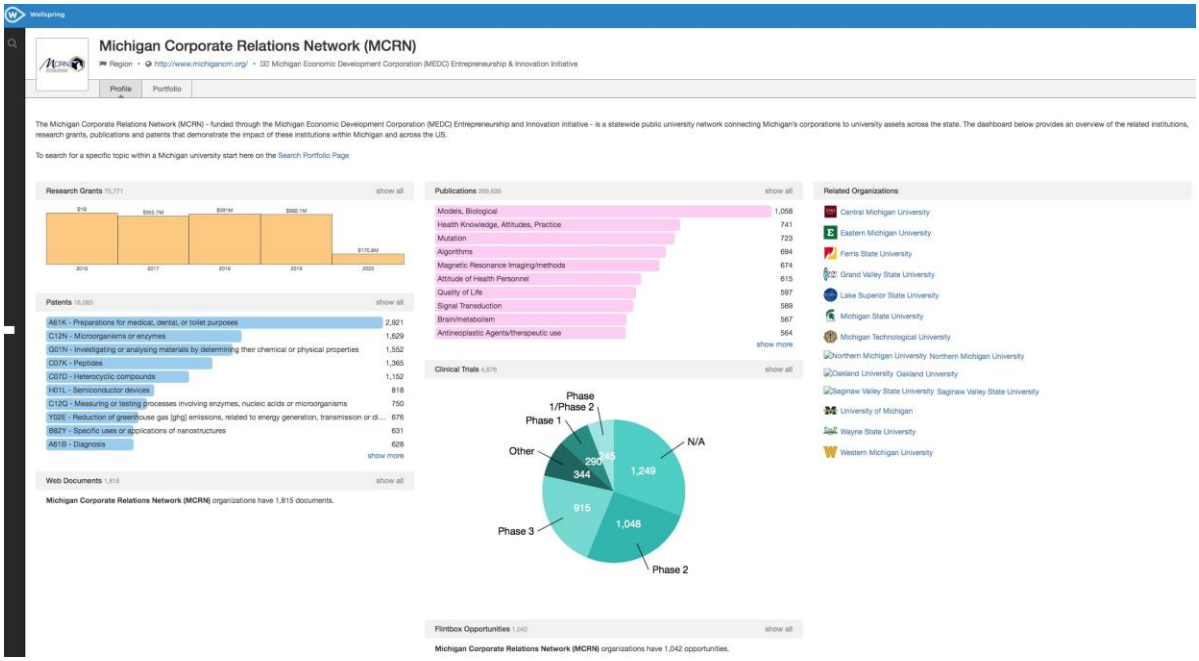
Source: Georgia Research Alliance

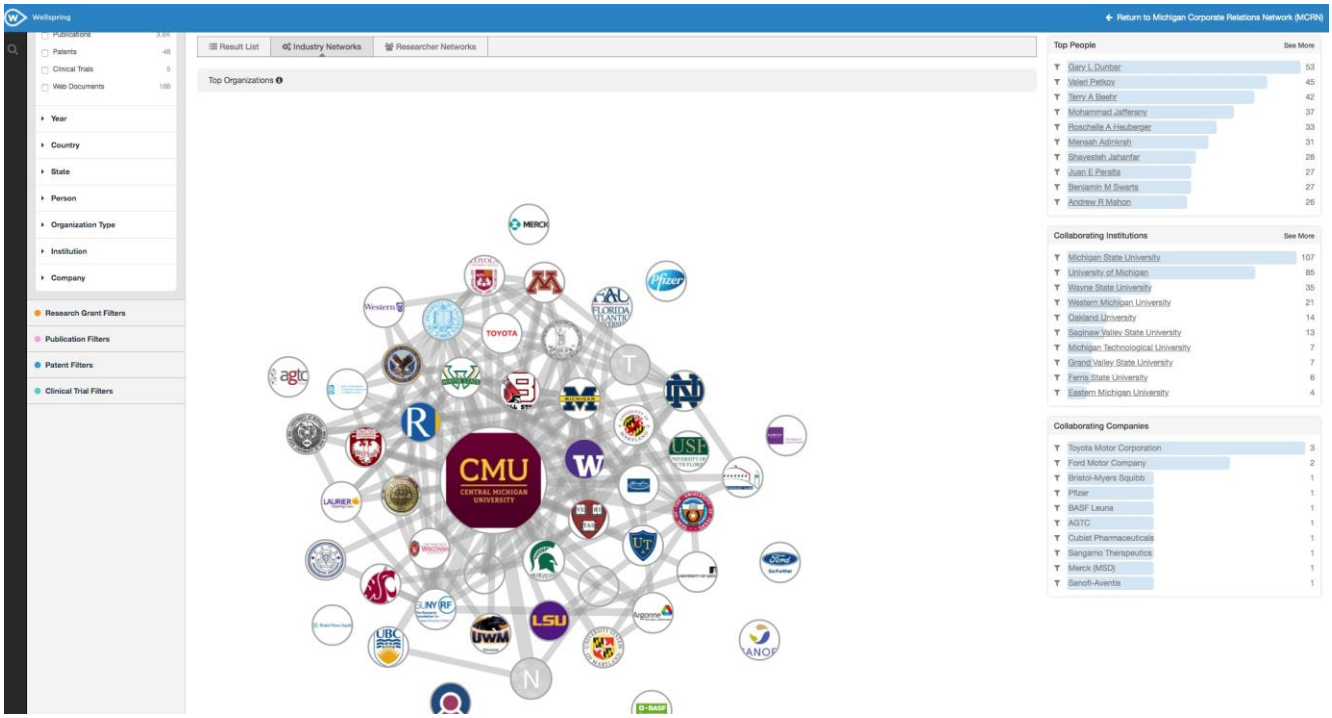
University of Missouri System - Faculty Scholars



Source: [University of Missouri Faculty Scholars Portal]

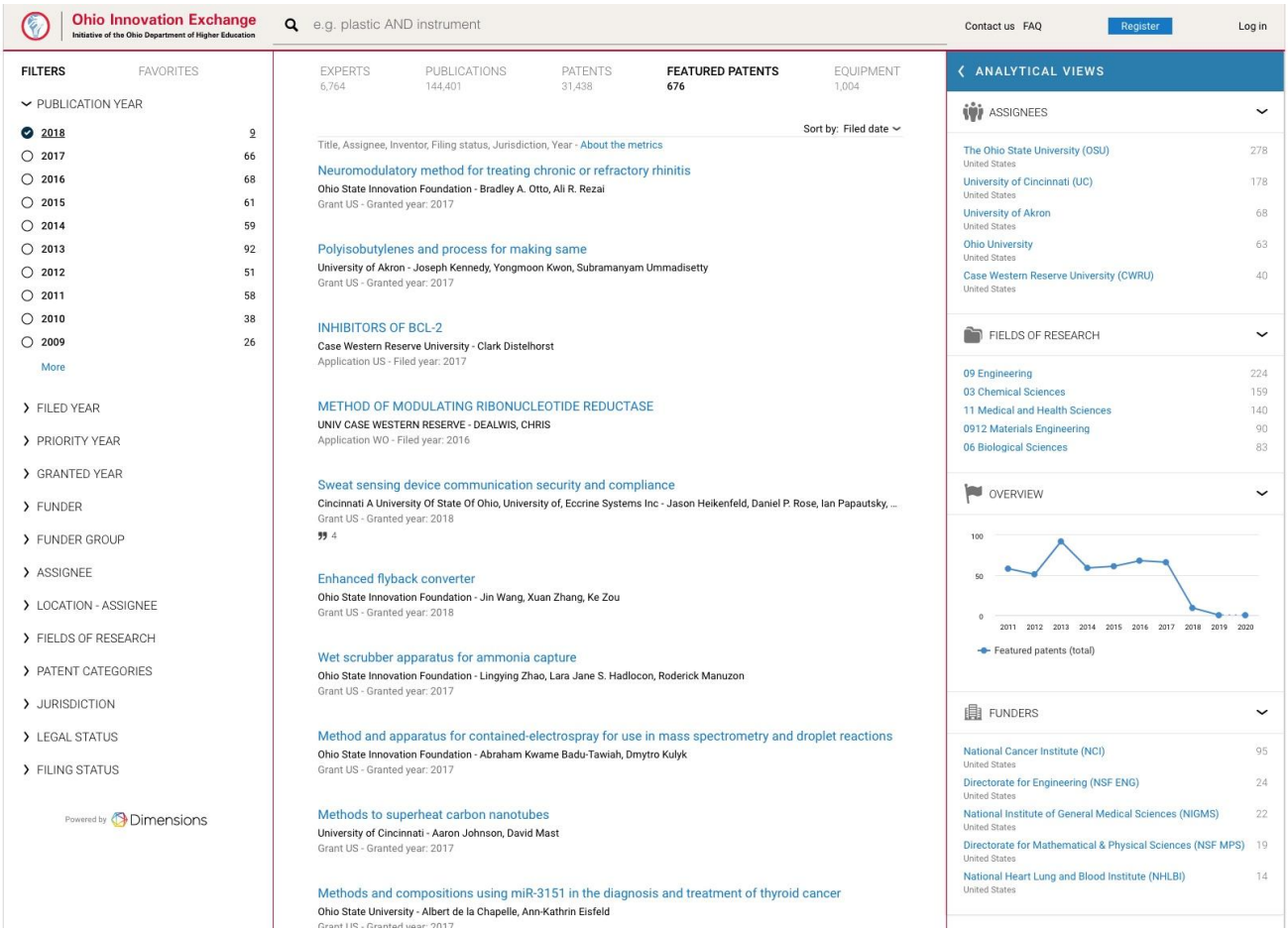
Michigan Corporate Relations Network





Source: [Michigan Corporate Relations Network]

Ohio Innovation Exchange



Source: [Ohio Innovation Exchange]