



Annual Report 2020-21

Empowering people to jumpstart their tech careers or companies in Chicago



CONTENTS

From the Executive Director	3
DPI Mission	5
Partners	7
Pritzker Tech Talent Labs	9
Workforce Education	10
Community Education	14
IWERC	17
Applied Research and Development	19
Ventures	22
SHIELD T3	24
Innovation Hub at The 78	25
Policy	26
Academic Affairs and Governance	27
Development	29
Progress against Objectives	31
Appendix: The Team	32





hicago is a world-class city and an established leader in an array of sectors, including manufacturing, finance, transportation, printing, publishing, retail, and healthcare. Today, Chicago and Illinois are establishing themselves as tech and healthcare hubs, where every business is a tech business and healthcare is being revolutionized through tech. The worldwide market opportunity created by digitalization and data insights is estimated to be worth \$20 trillion—well over 20% of global GDP¹. To take a leading role in this new economy and tech revolution. Chicago and Illinois must continue to reinvent themselves and invest in the tech ecosystem as it grows across an increasing number of industries and occupations in the sectors where they have a natural right to win. We must use this opportunity to transform educational and business approaches to create inclusive career pathways for underrepresented and diverse populations. In this way, we will make our city, our state, and our people our advantage.

Discovery Partners Institute (DPI) is playing a role in this tech revolution by bringing together top research talent across academia and industry, creating new businesses to forge

pathways from ideation to economic growth, and supporting policies to use governmental levers to drive change, bringing our science to reality. A top-notch educational and research network calls Illinois home and not only trains tech talent, but also creates new companies and generates ideas to help existing ones. Just as an example, the University of Illinois helped to answer COVID issues by creating a safe ecosystem via SHIELD's target, test, and tell model, and then rolled out this model across the country and world.

Illinois has an ever-growing tech-ready talent pool and DPI can accelerate that growth using the power of its **Pritzker Tech Talent Labs**. By enabling work experiences in new startups and tech talent development programs, the Pritzker Tech Talent Labs are preparing students for tech jobs and deploying workforce development programs that open better career opportunities. DPI is on a path to redefine talent development, giving access to the underemployed and underrepresented Chicagoans and Illinoisans who will become a formidable tech workforce.

DPI's work must happen at scale so Illinois can lead and make the desired great impact on the world. Chicago is a city of innovation, revival, and transformation. Illinois has a remarkable abundance of advantages, including agricultural capabilities, the richest farmland in the world, a central location, first rate educational and research institutions, and a big local talent pool. Combined, Chicago and Illinois are unstoppable and will act as a force multiplier for creativity and keeping businesses and talent in the region.

DPI is bringing a singular focus and a concerted effort to tech in Chicago and Illinois. It is leveraging its strategic advantage of being part of the **University of Illinois** with an ambitious agenda. DPI is shepherding the power and capabilities of the University of Illinois along with an extensive set of global and local partners to deliver an impact that goes well beyond the efforts of the individual universities and colleges.

Bill Jackson

Executive Director
Discovery Partners Institute



DPI is bringing a singular focus and a concerted effort to tech in Chicago and Illinois.



¹ International Data Corporation

DPI Mission

The Discovery Partners Institute's ambition is to make Chicago an unrivaled and inclusive tech economy over the next decade. Led by the University of Illinois System in partnership with top research universities, it does three things: tech talent development, applied R&D, and business building.

DPI's foundational purpose is to create economic value for Illinois by building its tech economy preeminence. It is focused on delivering in three areas—tech talent development, applied tech research and development, and business building and scaling.

DPI is creating opportunities for students to enter the tech workforce, as well as for workers to switch to higher paying jobs and careers. Emphasis is placed on creating opportunities for groups who are underrepresented in the tech workforce. DPI, through its Pritzker Tech Talent Labs, aims to train 7,000 students each year, of which 40% will be women, LatinX, or Black. We are on a path to scale diverse talent development.

DPI is building a substantial applied research base. Chicago and Illinois are home not only to top public and private universities, but also to leading companies and organizations, including the Chicago Board of Trade, Walgreens, Caterpillar, John Deere, Archer Daniels Midland, Allstate, State Farm, Boeing, United Airlines, and others. The state has a natural advantage in sectors represented by these companies, and DPI will build a research base at the intersection of the research institutions' capabilities and the advantaged sectors.

The research base is generating innovations that DPI is helping transform into businesses and economic activity. DPI is identifying opportunities, forming and supporting start-ups, and pursuing commercialization. Illinois has funded new facilities at "The 78" (scheduled to open in 2025) and DPI is working to create an Innovation Hub anchored around its new facility.



DPI Does Three Things



Workforce Education

- Immersion
- · Workforce Development
- Graduate Programs
- Lifelong Learning
- Career Pathways

Community Education

- K-12 Programming
- Teacher Training
- Community College Tech Development
- Career Pathways



System Wide Sectors

- Food and Agriculture
- Health and Wellness
- Finance and Insurance
- Transportation/Logistics
- Water Environment/Climate
- Information Technology
- Infractructuro
- Digital Government

Digital Capabilities

- Al/Machine Learning
- Big Data
- Cyber and Privacy
- Distributed Systems
- Quantum Computing



Ventures

- Identifying Opportunities for Start-ups
- Business Plan Development
- Mentoring
- Business Building Support

78 Ecosystem

- Help Facilitate the Ecosystem
- Build out The 78

DPI focuses on three things, as depicted in the exhibit above.

Pritzker Tech Talent Labs 1. through its Workforce **Education** and **Community Education** units. Programs include K-12 programming for students and training for teachers, community college tech development, immersion programs for college students, tech workforce development programs, and graduate programs. A High-School-to-Career Pathways program, led by the Pritzker Tech Talent Labs, will provide the connective tissue across these efforts and grow the pool of underrepresented tech talent.

- 2. Applied R&D by deploying five key new economy capabilities (Al/Machine Learning, Big Data, Cyber and Privacy, Distributed Systems, and Quantum Computing) across eight sectors, which include Food and Agriculture, Health and Wellness, Finance and Insurance, Transportation/Logistics, Water Environment/Climate, Information Technology, Infrastructure, and Digital Government.
- 3. Business Building by a
 Ventures unit to translate
 innovation into economic
 growth and keep startups in Illinois. It will create
 a vibrant entrepreneurial
 ecosystem by developing an
 Innovation Hub at The 78,
 funded by state investment.



DPI will supplement these three areas of focus with a set of policy initiatives to influence governmental levers to facilitate Chicago's and Illinois's economic growth in tech. ■

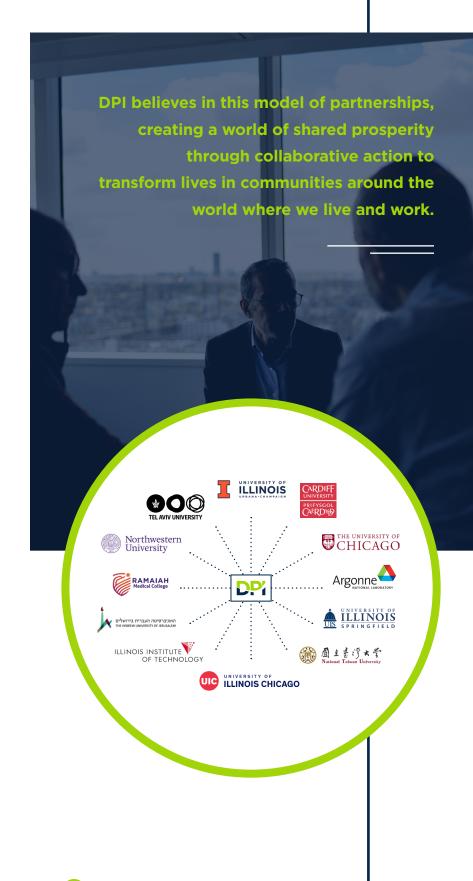
Partners

Water, climate impact, food, human health, social networks, new energy, socially responsible technology, and equity are not abstract issues, but needs for millions of people around the world to improve their lives. DPI sits at the heart of a series of partnerships, joining forces with institutions across the globe to help tackle our world's more pressing human issues through technologies.

DPI is supported by international collaborators who themselves sustain networks of partners. DPI believes in this model of partnerships, creating a world of shared prosperity through collaborative action to transform lives in communities around the world where we live and work.

A global network of partners located in Illinois and across three continents are coming together through their and DPI's efforts. DPI has partnerships with twelve leading higher education and research institutions, including Argonne National Laboratory, Cardiff University, Hebrew University of Jerusalem, Illinois Institute of Technology, MS Ramaiah College of Medicine, National Taiwan University, Northwestern University, Tel Aviv University, University of Chicago, University of Illinois at Chicago, University of Illinois at Springfield, and University of Illinois at Urbana-Champaign. Their participation in DPI programs enriches their quality by bringing in leading experts from multiple universities to work together with DPI.

Activities of this network of partners are coordinated through DPI's Partners Council, which consists of senior leaders of all partner organizations. The Council defines priorities for joint programs, reviews progress of on-going joint programs, and evaluates new joint programs under development.





DPI's initial efforts with its partners have largely focused on joint research, but much more is needed, including educational programs, global internships, and joint business building. We are excited by our partners' commitment and engagement. We are better together.

Progress This Year

DPI partners actively participated in the proposals for the 2020 Science Teams. Out of the nine Science Teams funded in 2020, five teams had faculty from DPI partners outside the University of Illinois System.

DPI has significantly improved networking with its partners during the year. Partners are also invited to provide input in development of applied research and education programs. As a result of these efforts, we expect a significant increase in participation of partners in DPI during 2021.

Goals for Next Year

Next year's work will focus on four key elements:

- 1. Expand partners' network. DPI will invite several leading international universities to join it. Universidad Nacional Autónoma de México (the National Autonomous University of Mexico) is among the universities joining DPI in 2021.
- 2. Launch postdoctoral fellowship program. This new program will enable postdocs from partner institutions to spend up to two years working with a Science Team at DPI.
- 3. Launch summer immersion program for international partners. This program will be designed mainly for students from international partners. Students will spend two weeks at DPI learning about the innovation and entrepreneurship ecosystem in Chicago and experiencing the rich Chicago culture.
- 4. Increase partners' participation in DPI Science Teams. DPI is working towards increasing the number of partners and the number of faculty from each partner participating in the 2021 Science Teams. ■



Teacher Training

Building capacity for schools to establish and teach computer science courses



K-12 CS Skills

Skills and learning pathways into computing, data science, and analytics



Community College Digital

Skills and learning pathways into computing, data science and analytics



Immersion

Connect top students with new learning experiences relevant to tech employers



Graduate Programs

A new Masters degree in tech leadership for those seeking executive management roles



Workforce Development

Upskilling and reskilling for 21st century jobs in data analytics

PRITZKER TECH TALENT LABS SYSTEM APPROACH

High-School-to-Career Pathways

Flagship learning platform that leverages traditional education and online tech education to ensure skill mastery

Lifelong Growth and Learning Mindset

Credential programs paired with on-ramp support structures in partnership with companies, community colleges, and employers

Pritzker Tech Talent Labs

As technology plays an increasingly central role in economic, social, and civil life, there is an urgent need for Chicago and Illinois to play a greater role in building a tech workforce, in raw numbers and in better representation for underrepresented groups. The tech ecosystem will continue to grow across industries and occupations, creating opportunities for job creation and improved wage and living conditions. DPI is focused on helping create a larger and more inclusive tech ecosystem.

Pritzker Tech Talent Labs are focused on developing new economy skills across many sectors, including managing and analyzing data, software development, digital product/project management, business building and launch, critical thinking, collaboration, and communication.

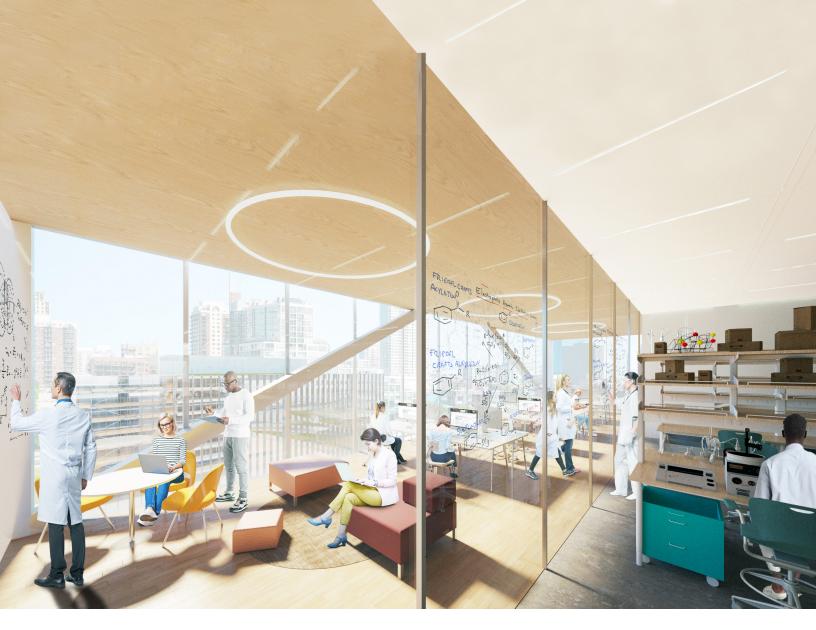
For the foreseeable future, the focus is on new economy jobs with an emphasis on applied computing and digital and data analytics. Core to the program will be ensuring social mobility and wage improvement for disadvantaged communities.



"We have to do more to help workers, particularly women and people of color, acquire the skills they need to adapt, adjust, and thrive, given this accelerating impact of automation and digitization, and the fraying social safety net." - Penny Pritzker

Pritzker Tech Talent Labs naturally organize by program around six workforce and educational initiatives (see left). We describe them below in two sections: Workforce Education and Community Education. DPI will have common approaches to our shared constituencies. The programs are built from workplace needs and will develop the technical, human, and industry-based skills needed for each new economy job.

In collaboration across all initiatives, the Pritzker Tech Talent Labs will lead our High-School-to-Career Pathways program that will use a systems approach to guide students from high school to a successful career in tech, with an intentional focus on underrepresented and underserved populations.



Workforce **Education**

The highest wages are concentrated in tech jobs, both in tech and non-tech industries. Tech workers without a bachelor's degree in tech earn around 80% more than in Chicago overall.

The mission of Pritzker Tech Talent Labs is to make careers in technology accessible to the amazing talent within our great city and state, and thus provide employers in Chicago and Illinois with a highly qualified tech workforce. Social and economic mobility are core to DPI. Our emphasis on diversity, equity, and inclusion allows more people in traditionally underrepresented groups to pursue tech careers.



The Pritzker Tech Talent Labs are creating an inclusive tech development system at a whole new scale, convening key partners from DPI, the University of Illinois System, and educational and corporate leaders across the state.

The Pritzker Tech Talent Labs' workforce education is organized around **four Centers of Excellence**:

- 1. Immersion Pritzker Tech Talent Labs Immersion programs are primarily focused on getting participants (undergraduate & graduate) the realworld experiences they need to be more competitively advantaged when seeking full-time employment. We offer a combination of internships, micro-internships, virtual learning, and experiential programs to accomplish these goals. Some are team-based, and some are for individuals. They can be located at companies or within DPI.
- 2. Workforce Development Pritzker Tech Talent Labs workforce development programs identify and build additional on-ramps into the technology industry for those that may be unemployed, underemployed, or simply unaware of the opportunities that are available. They create opportunities for participants to upskill and reskill to improve their competitiveness in the marketplace.
- 3. Graduate Programs As companies undergo digital transformations, they need talent that can lead these digital-first businesses. Historically, a combination of technical and business acumen was stitched together through undergraduate and graduate study in engineering and business. We are



building graduate programs that intentionally focus on building tech leadership talent.

4. Lifelong Learning - At Pritzker
Tech Talent Labs, we want people
to continue to grow their skills
and advance their careers. To help
facilitate this, we are building a
technology platform focused on
creating structures and incentives
for participants to continue learning
throughout their lives.

Across all centers, the design, implementation, and execution of our programs is grounded in four guiding principles, as illustrated below.



Culturally Sustaining

DPI's programs will treat diversity as an asset on which companies and education improve and thrive



Competency-Based

Recognizing that employers need specific competencies, DPI's programs will focus on developing job-relevant skills and competencies



Thinking Curriculum

Based on insights from developmental psychology, our curriculum will develop the skills and values needed for decision making, team building, and innovation



Learning Science-Rooted

DPI's initiatives and programs will be rooted in empirical data for effective pedagogy The initial launch of the Pritzker Tech Talent Labs was made possible by a generous \$10M gift from the Pritzker Foundation.

Progress This Year

The COVID-19 pandemic made this past year a challenging one. Our focus has been on starting up Workforce Development and building out Immersion programs on the foundation of UIUC's Engineering City Scholars program.

Immersion

Engineering City Scholars is an experiential-based program designed to bring UIUC's computer science and computer engineering students to Chicago for a semester of courses and part-time internships with leading Chicago companies to give them exposure to the Chicago and Illinois tech industry and provide local employment opportunities upon graduation. In the past year, 67 students participated in this program.

Startup City Scholars, an additional track of the Engineering City Scholars program, focused on student entrepreneurship and is run as a partnership between Grainger College of Engineering and the University of Chicago's New Venture Challenge. This past year, 12 University of Illinois Urbana-Champaign students participated in this program alongside 20 University of Chicago classmates competing for over \$100,000 in investment funding.

We also launched DPI Research Scholars in partnership with the DPI research teams, the Illinois Institute of Technology, and the University of Illinois. This experiential program brings together students to work on projects led by DPI Science Teams that generate meaningful experiences for the researchers and students. In the last year, 30 students participated in this program.

Workforce Development

TechReady was launched during the COVID pandemic to provide displaced workers with opportunities to upskill and reskill for tech employment. The high-quality programs come from the finest academic institutions and partners. More than 300 students participated in the program.

"What the City Scholars program does is it allows you to take what you're learning in the classroom and apply it right to your job as you're learning those things. It really helps solidify what you're doing."

– <mark>Daniel Paczkowski</mark>, Computer Science. Graduated in 2020:

Spring 2020 City Scholar at DRW Currently employed full-time as Software Developer at DRW

"It (Research Scholars)
did give me a whole new
perspective on what Al
can do, even in fields you
might not think of as
Al-predominant."

– Devyani Gauri,

Artificial Intelligence, Graduated May 2021;

Spring 2021 DPI Research Scholar for AI in Construction team; Currently a graduate student in M.S. in Artificial Intelligence, Northwestern University

We are working with many potential partners to develop a robust offering of tech-oriented programs to allow participants to enhance their careers. TechReady supports experienced professionals looking to sharpen their skills and others interested in pivoting to a tech career. In one example, we are working

The initial launch of the Pritzker Tech Talent Labs was made possible by a generous gift from the Pritzker Foundation of

\$10

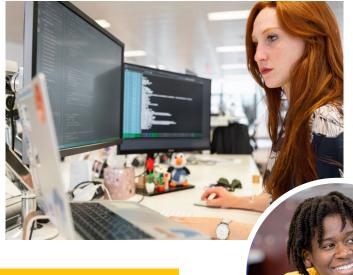
with the University of Illinois Chicago and the Fullstack Academy (leading software development boot camp) to launch a program in software development, cybersecurity, and data science. Sixtyseven students enrolled in the initial Spring 2021 cohort. DPI will continue to expand TechReady programs with new certificates, opportunities, and benefits.

We are working with the Chicago Apprenticeship Network and with the City Colleges of Chicago to develop apprenticeship programs that will validate to employers that those who have gone through our upskilling and reskilling programs are fully capable of delivering outcomes. This validation is critical to expand the pool of talent beyond the traditional four-year degree graduates.

Graduate Programs

Traditionally, MBA programs have enabled students to advance their careers towards a track in business and management. Large corporations, consulting firms, and investment banks have customarily been the biggest employers of choice for students graduating from business schools. Yet technology-based companies have increasingly established themselves as a recruiter of choice. In addition, many "traditional" corporations have developed or are developing data- and tech-enabled businesses, using new trends in technology like cloud computing, the Internet of Things, digital transformation, etc. Both types of businesses require leaders who are not only equipped to solve business problems, but also have sufficient grounding in technology to become leaders in technology-based and data-enabled businesses. This past year we have conducted research and found a growing need for tech leaders who have engineering know-how along with a design and critical thinking mindset, business acumen, and analytical and people/ team skills. Our research exposed a gap in the curriculum for students aiming for leadership positions in tech-based and data-enabled businesses.

DPI is working with Grainger College of Engineering at the University of Illinois Urbana-Champaign to design a set of professional graduate certificates in technology leadership.



Goals for Next Year

Over the next year, we will continue to build out our programs. Immersion plans to launch a parallel project-based learning program where 5-10 student teams work with companies on specific problems. We are planning a pilot for the fall of 2021 with 30 students. We are also planning to pilot a virtual mentoring program for 50 students.

Workforce Development will continue to work with our partners to build out our programs. TechReady is being re-designed to further simplify the customer journey and provide wraparound support. We expect over 750 participants during the next year. We will launch an Inclusive Tech Fellows program that provides training and support services such as laptops, highspeed Internet, and stipends. We expect to recruit 100 Black, LatinX, and women participants. We are helping to grow the iCAN program, recently established at the Grainger College of Engineering, which offers a non-degree computer science certification to students who have a nontech bachelor's degree. Finally, we are developing professional industry-specific programs such as artificial intelligence in construction, financial tech, government tech, and others.

A Graduate Program will be designed that initially focuses on a certificate in tech leadership for engineers and will expand to a set of related certificates.

We are kicking off a Lifelong Learning research project to understand the needs and options, and to lay the foundation for the design of this platform.



Community Education

DPI's Community Education unit is focused on establishing programming for middle, high school, and community college learners and educators to develop skills and learning pathways into computing and tech-related fields. We aim to increase the participation of Black, LatinX, female, and other underrepresented populations in computer science, data science, and related fields of study at Illinois institutions—advancing pathways into DPI's Pritzker Tech Talent Labs programs and thriving in Chicago's tech ecosystem.

We are focused on making a sizable impact on the Illinois tech community, and so we must scale our program accordingly. Our targets are 1,000 students and 200 teachers by FY 25-26. To reach these goals, we are developing systemic and holistic programs that both create capacity for computer science education and build a better coordinated pathway in computing by aligning K-12, 2-year and 4-year institutions, non-profits, community-based entities, and employers.

To achieve these objectives, Community Education is deploying two sets of programs:

- Student Programs target middle, high school, and community college learners to develop skills and learning pathways into computing (computer science, computer engineering, information sciences), data science and analytics, and other tech-related fields. They provide mentoring and career readiness, including skills tied to problem solving, communications, and team building. And they connect students to careers and opportunities in the Chicago tech community. Programming includes aligning an ecosystem of K-12 school districts, 2-year and 4-year higher education institutions, non-profit providers (including out-of-school time and community-based organizations), and employers to holistically recruit, train, and retain diverse homegrown talent in computing.
- 2. Teacher Training Programs increase the number and proficiency of those teaching computer and data science in the State of Illinois by building capacity for schools to establish and expand computer science courses and curriculum, and by supporting

DPI is aiming to target

1,000 STUDENTS

and

200 TEACHERS

by FY 25-26.

the integration of computer science, computational thinking, and tech approaches across the curriculum. These efforts are especially intended to expand the number of teachers teaching computer science (CS) to coincide with the rollout of statewide CS standards and a new state law requiring school districts to offer at least one computer science course that is aligned with CS learning standards. It is important that our programs address the current disparities for underserved and underrepresented populations in computer science and tech. Our programs will create more access to CS learning, especially advanced CS courses; generate more inclusion, sense of belonging, and identity for marginalized communities who have not seen themselves represented in tech; and provide more pathways to pursuing CS and tech related fields at Illinois universities.

Progress This Year

Student Programs

DPI created the **Digital Scholars program** in partnership with the University of Illinois Chicago CHANCE Program. This is an intensive, free, five-week summer program for high school juniors and seniors enrolling in college in the fall. Students took one of two college-level UIC computer science courses (CS 100 or CS 111) and received college credit or a tuition-free CS course while enrolled at UIC in the fall. Key parts of the program are enhancing college and career readiness, and connecting these students with CS practitioners and technologists to learn more about the application of CS in the real world and to become more immersed in Chicago's tech community. Our goal is to build a deeper and more diverse pool of homegrown students pursuing computer science degrees in Illinois. Forty students participated last summer, of whom 75% were Black or LatinX, 60% were from CPS, and 35% were female.

Much of our work throughout the past year has been focused on scaling the Digital Scholars program in summer 2021 with expanded learning tracks and new funding



"My favorite part was hearing from our guest professional speakers ... We got to hear about their computer science journey and how far they've gotten ... as well as giving us advice and insight."

 Darlene Marchan, alumna of 2020 Digital Scholars Program, UIC CS Major

"I'm glad I was able to challenge my computer science skills and work with new people. Not only did they fill me with a sense of excitement heading towards my career path, but also made me more prepared for life after high school."

- Reggie Adu, alum of DPI's 2020 Digital Scholars Program, UIC CS Major

partners. This includes a new partnership with Wilbur Wright College and expansion to year-round programming.

Teacher Training Programs

Community Education partnered with UIUC's College of Education to launch **Teaching Endorsement in Computer** Science (CSTed), the state's first all-online CS endorsement program. The courses were developed by faculty and research staff at the UIUC College of Education and The Grainger College of Engineering. The endorsement began with its inaugural cohort of practicing teachers in grades 5-12 in summer 2021 (June 14 - August 7).

In preparation for the endorsement, Community Education collaborated with Chicago Public Schools and other K-12, higher education, and education partners to recruit teachers, secure funding to subsidize tuition costs for participating teachers, and develop strategies to advance computer science education in Illinois by equipping schools with qualified CS instructors.

DPI is actively recruiting teachers to take part in the endorsement program and securing funding for tuition costs. In addition, the Community Education unit is cultivating a community of practice among teachers to ensure successful and equitable delivery of statewide CS education, including in the deployment of dual credit and Advanced Placement CS courses and embedding a peer mentoring network into each cohort of teachers.

Goals for Next Year

Next year we are growing our **Student** Programs by expanding the Digital Scholars program and launching yearround programs as part of a broader Computing Pipeline Partnership. We are adding new learning tracks to the Digital Scholars program: one in data science, being developed in partnership with UIUC's College of Liberal Arts & Sciences; and one in mobile app development, made possible through a new partnership with Apple. New partnerships have also been established with One Summer Chicago and CPS's Career and Technical Education to offer stipends to students participating in the Digital Scholars program.

In addition, we will deploy the Digital Bridge program to expand the reach of Digital Scholars to City College students. The program will provide weekly DPIled workshops to approximately 50 students participating in Wright College's NSF-funded Engineering and Computer Science Summer Bridge Program and other students with an interest in computing. DPI is partnering with



World Business Chicago's ThinkChicago program and other tech leaders to develop these sessions.

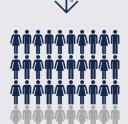
In partnership with Wilbur Wright College (City Colleges of Chicago's center for excellence for engineering and computer science), DPI will develop a Computing Pipeline Partnership to recruit, train, and retain diverse homegrown talent in computing in Chicago. This includes yearround boot camps for high school freshman and sophomores that provide motivation and sense of belonging to pursue careers in computer science and tech, information on diverse computing jobs, one-onone interactions with practitioners, and opportunities to develop skills.

Community Education will continue to strengthen the **Teacher Training Programs** by strengthening recruitment, fundraising, and partnership development efforts to expand throughout the State of Illinois. In addition, Community Education will support the inaugural cohort of teachers as they advance through the CS teaching endorsement pathway.

We will hold professional development workshops and learning experiences for teachers to coincide with the rollout of statewide CS learning standards by targeting current gaps in existing professional development offerings.

Breaking Down DPI's 2020 Digital **Scholars Program**





75% Black or LatinX

CPS students





IWERC

The Illinois Workforce and Education Research Collaborative (IWERC) conducts education research to support Illinois education and workforce outcomes. Its mission is to work with community partners across the state to research and co-construct solutions to the most pressing issues in the cradle-to-career, education-to-workforce pipeline. Its vision is that Illinois education and workforce development organizations have reliable. relevant, and actionable research on which to base decisions.

IWERC divides its research portfolio into three types of research projects:

- 1. Urgent statewide projects identified by a Research Advisory Council of diverse stakeholders.
- 2. DPI-facing projects designed to support DPI's tech talent and community education initiatives, and
- 3. Opportunistic projects that respond to pressing state needs and strengthen key partnerships.

Progress This Year

IWERC launched in September 2020, with the hiring of a director. The initial focus was on creating foundational policy documents (e.g., mission, vision, core principles, research process, funding model, day-to-day operations, and research agenda), establishing an Advisory Board of 12 members and a Research Advisory Council of 84 statewide stakeholders, and deploying extensive outreach (e.g., University of Illinois System, state government and agency officials, external research units, teachers' unions, K-12 networks, policy institutes). Seven researchers were hired, and all will join the team this summer.

Statewide Projects

To identify the most pressing needs for the state, IWERC engaged in extensive outreach with educators, researchers, and policymakers to develop a list of possible research topics at four education levels: early childhood, K-12, postsecondary, and workforce.

[IWERC's] vision is that Illinois education and workforce development organizations have reliable. relevant, and actionable research on which to base decisions.



The IWERC Research Advisory Council reviewed the list and selected three priority research topics:

- Effective student pathways through early childhood programs and services
- Maintaining a diverse early childhood and K-12 educator workforce
- Effective high-school-to-work pathways

IWERC researchers are planning each of these projects, with initial state approval for access to data elements and initial partnerships with external research groups, ISBE, and teacher education programs.

DPI-facing Projects

IWERC has supported several research tasks related to work at DPI and its Pritzker Tech Talent Labs. This included overseeing a systematic literature review on effective tech talent workforce development programs for diverse learners, overseeing research briefs on labor market data related to specific occupations in the Chicago tech sector (including tech leaders and software developers), participating in initial work related to a Chicago tech ecosystem report in collaboration with GET Cities and AnitaB. org, and seeking funding to support DPI's computer science education work.

Opportunistic Projects

IWERC has begun work on several key partnerships. As an example, it is partnering with ISBE to examine student involvement in state-funded early childhood services and school outcomes (at kindergarten and beyond) and to conduct focus groups and surveys with teachers to understand the effects of COVIDrelated teacher licensure waivers.

Goals for Next Year

In general, IWERC's plan for next year is to execute projects identified this year. We will submit grant proposals related to each of the core statewide projects of early childhood pathways, teacher workforce, and high-school-to-work. We will complete research reviews on areas of statewide interest, including how to integrate trauma-responsive teaching into post-pandemic schooling. We will continue DPI-facing and opportunistic projects.

In addition, IWERC will work with diverse partners to better understand community-based needs and expected education-system outcomes on pressing issues facing the state.

Applied Research and Development

Applied Research and Development at DPI aims to build a world-class applied research capability centered around data and computing. This includes federally and foundation sponsored research, company contracted research, and innovations to be commercialized through DPI's Ventures unit. DPI is partnering not only with the universities within the University of Illinois System, but also with other universities across the globe and other research institutions.

The work focuses on eight sectors of importance and advantage for Chicago and Illinois, and deploys specific data and computing capabilities, as illustrated at left. Each sector is led by a University of Illinois System faculty member with broad expertise in the particular theme, who advises DPI on research needs and direction.

DPI-sponsored Science Teams, composed of faculty from University of Illinois campuses and partner institutions, are central to building a robust R&D portfolio. Through annual seed grant competitions, DPI attracts and establishes winning Science Teams within and across sectors. Once selected, DPI works with the teams to support large grant applications and commercial opportunities based on their research expertise and project goals. DPI also supports cross fertilization among the Science Teams and with DPI research scientists. This benefit only increases with the addition of new Science Teams every year.

The DPI-applied R&D team is also building its own internal research capabilities that include distinguished research scientists, campus-based research centers, and core physical assets. These capabilities will facilitate cross-Science Team funding applications and new business opportunities.

Through sector leadership, Science Teams, and internal capabilities, the applied R&D team will make great strides for Illinois through high-impact business creation and large federal funding opportunities.

Research Work

Sectors

- Food and Agriculture
- Health and Wellness
- Finance and Insurance
- Transportation/Logistics
- Water Environment/Climate
- Information Technology
- Infrastructure
- Digital Government

Capabilities

- Al/Machine Learning
- Big Data
- Cyber and Privacy
- Distributed Systems
- Quantum Computing



Progress This Year

Science Teams

In 2020 we inaugurated the first group of DPI Science Teams. Science Teams are composed of faculty from the University of Illinois System and partner institutions. The teams are focused on research questions of interest to the State of Illinois and that also have strong commercialization potential. The teams are supported with \$125K in seed funding to mature the research, acquire new researching funding, and commercialize their work by creating a start-up company, or through licensing or consulting opportunities. Our nine current teams are briefly summarized below.

- 1. CREATE WISDOM: Clinical Research, **Engineering and AI to Address** Wicked Problems in Healthcare: The CREATE WISDOM team uses data from Chicago hospitals to develop artificial intelligence technologies that improve patient outcomes. The team is led by Karl Kochendorfer (UIC) and includes researchers from UIC, UIUC, Northwestern, Rush, Mayo, and DuPage Medical.
- 2. I-BRAIN Illinois Brain Analytics Institute: I-BRAIN brings together patient data, experts, and a novel data platform to understand and develop new treatments and improve clinical care for brain disorders. The team is led by Jeff Loeb (UIC) and includes researchers from UIC, UIUC, University of Chicago, IIT, and industry partners. I-BRAIN Therapeutics was recently incorporated to commercialize the technology.
- 3. Trustworthy and Robust AI: This team is working to 1) make Illinois a national and world leader in trustworthy and robust artificial intelligence, 2) rejuvenate Illinois's industry with new science and technology, 3) establish funded centers for Trustworthy AI, and 4) provide related education and training. The team is led by Madhusudan Parthasarathy (UIUC) and includes researchers from UIC, UIUC, University of Chicago, Tel Aviv University, and Hebrew University.

- 4. Center for Autonomous Construction, Agriculture and Manufacturing at Scale (CEACAMS): CEACAMS is establishing partnerships between academia, government entities, industry, and Illinois-based start-ups to meet the challenges of developing Autonomous Construction, Agriculture and Manufacturing at Scale (ACAMS) systems. This UIUC team is led by Bob Norris (UIUC).
- 5. Wastewater-based Epidemiology: The WBE team is assembling and deploying capabilities for SARS-CoV-2 surveillance in wastewater. Understanding, modeling, and tracking pathogens such as the coronavirus responsible for the current pandemic will have far-reaching economic and societal impact. The team is led by Rachel Poretsky (UIC) and includes researchers from UIC, Northwestern, and Argonne National Laboratory. This Science Team has been successful in acquiring additional funding: \$1.25M from the Walder Foundation plus \$5.5M from the Illinois Department of Public Health.



6. Center for Research on Autonomous Farming Technologies (CRAFT): CRAFT will unite researchers, industry, educators, and stakeholders to drive research, education, and outreach for



autonomous systems in agriculture across Illinois. The team is led by Girish Chowdhary (UIUC) and includes researchers from UIUC, University of Chicago, and Argonne National Laboratory. This Science Team received a \$20M grant from the NSF to launch an AIFARMS Institute.

- 7. Al Institute for Construction: This institute will create the foundational ideas, technologies, and technical workforce that allow Al research to support safe, productive, and efficient design, construction, and maintenance of buildings and infrastructure systems. The team is led by Mani Golparvar Fard (UIUC) and includes members from UIUC and numerous industry partners.
- 8. Privacy in the Era of Big Data: This project team develops solutions to all issues concerning privacy in the face of big data and machine learning without incurring major performance penalties. It is led by Lenore Zuck (UIC) and includes researchers from UIC and UIUC.
- 9. Kidney Wellness Institute of Illinois (KIWII): KIWII is building an international center of excellence and leadership in wellness for individuals with chronic kidney disease. KIWII brings together leaders in research, medicine, industry, and patient-advocacy to address this issue. It utilizes technological innovations to optimize the implementation and effectiveness of behavioral intervention strategies. The team is led by Ken Wilund (UIUC) and includes researchers from UIC, UIUC, Loyola, University of Calgary, and numerous industry partners. KIWII established Joviality LLC, which offers health and wellness programming via virtual reality.

Internal DPI Research

In addition to supporting the research of Science Teams, the R&D Team is also focused on funding its own research activities and capabilities through grants from funding agencies. We received \$1.25M from the Walder Foundation and \$5.5M from the Illinois Department of Public Health to greatly extend the wastewaterbased epidemiology team's efforts to monitor the incidence of SARS-CoV-2 in Illinois. We are also actively pursuing additional funding from many federal agencies (e.g., NSF, NIH, Department of Commerce, and Department of Energy) and have submitted proposals worth more than \$40M.

Goals for Next Year

We expect to fund another 10 Science Teams that will focus on research of interest to the State of Illinois and prioritize the teams with the strongest commercial potential. We are also exploring collaborations with DPI partner institutions to fund additional teams. We expect that the new set of teams will become active in the Fall of 2021. With additional Science Teams, we will be able to target more R&D funding and create new businesses.

We anticipate continuing current research activities surrounding wastewater-based epidemiology and establishing a research effort focused on climate change. In addition, we will initiate new research activities funded by proposals submitted in the past several months and we will write a significant number of new proposals with a goal of getting each Science Team to win \$1-3M over the life of the grant.

We will also hire additional research scientists in the next year to expand our capabilities and enhance our ability to lead grants in collaboration with our Science Teams. ■



Ventures

The Ventures unit aims to foster deep-tech focused business building in Chicago and Illinois. Special focus is placed on commercializing technology developed by the Science Teams in the R&D unit. Ventures will provide a suite of services tailored to the needs of deep-tech start-ups and their founding entrepreneurs, including office, laboratory, and workshop space, deep-tech mentors and entrepreneurs-in-residence, and access to capital and to industry partners or customers. As the businesses grow, we will also assist and mentor mid-sized companies through more advanced growth phases. Successful DPI start-up companies remaining in Illinois will create jobs and help retain highly qualified graduates and professionals in Illinois.

Initiatives

The Ventures unit is focused on four key elements in its business building activity, as illustrated in the exhibit at right.

- 1. Identifying opportunities for start-ups and forming them with training, business development, relationship building, and company formation support.
- 2. Business plan development to articulate the product development and address the full market opportunity, leveraging the Venture team, I-Corps training, etc.
- **3. Mentoring** for the start-ups through a network of senior executives (active or retired), experts, and entrepreneurs-in-residence.
- **4. Business building support**, including access to funding sources, HR support to recruit the management team, physical space, professional services, and other functional support.





Start-ups

Dedicated incubator capacity for DPI's research clusters that have the potential to create intellectual property and spin out new companies



Business Plan Development

Well developed program for vetting and assisting postdocs and graduate students who want to take their thesis or ideas into a new start-up business



Mentoring

Provide mentors, experts, and entrepreneurs-in-residence to provide advice and assistance in achieving company objectives



Business Building Support

Provides an incubator role for start-ups, including office space, access to venture capital, legal services, marketing services, and support functions



Progress This Year

Over the past year, the Ventures unit has started its activities. Several companies were launched, both from the DPI Science Teams and from technologies spinning out of faculty R&D at UIC. The Ventures team has mentored the founding entrepreneurs. In collaboration with the Technology Entrepreneur Center at UIUC, an I-Corps cohort was established and carried out. A graduate level "Scientific Entrepreneurship" course was taught at the UIC College of Pharmacy.

The DPI Ventures unit is also establishing collaboration with Illinois Ventures and EnterpriseWorks at UIUC.

Goals for Next Year

Over the next year, the Ventures unit will continue the work it has started. In addition, DPI Ventures will mobilize a dedicated professional team to pursue the initiatives articulated above and deepen the collaboration with Illinois Ventures and EnterpriseWorks.

Our goal is to establish five start-ups based on the research of the Science Teams in the Applied Research and Development unit. ■





SHIELD T3

The SHIELD programs at the University of Illinois demonstrate the power of working together and the power of DPI. The Governor of Illinois and the Deputy Governor called on the University of Illinois to help with a COVID response. The University of Illinois responded with insights suggesting needed actions and by establishing an advantaged testing ecosystem in SHIELD.

First working with the Governor's team and Illinois Department of Public Health, the University of Illinois—and in particular DPI helped set up a response program around testing by helping to hire staff, ensuring supply of critical materials, designing an overall program, setting up a program office, and hiring The Boston Consulting Group to head up the program office. These and other efforts led the University of Illinois and DPI to form three SHIELD programs—a campus program, SHIELD Illinois, and SHIELD T3.

DPI focused on building out the SHIELD T3 program to help other states and countries with their testing ecosystems. The team had over 100 conversations with different universities, companies, and countries.

In combating the COVID epidemic, SHIELD T3 uses a unique testing methodology developed at the University of Illinois Urbana-Champaign. Faculty developed this unique testing methodology and ecosystem, including a smartphone app with a quick response. Deploying a successful frequent and universal testing regimen requires the accuracy of a PCR test, the fast turnaround time of a local lab, the ease of a saliva sample, and the affordability of a lower-cost testing procedure. Together with the Safer Illinois app, the testing regimen forms an integrated ecosystem that is a key component of the COVID strategy on campus, under the motto "Target Test Tell" (T3). This testing methodology allowed the University of Illinois campuses to remain open during the whole academic year and maintain positivity rates generally well under 0.5%, and was the core of SHIELD Illinois's and SHIELD T3's offerings outside the University.



SHIELD T3 started in July and deployed its first lab in December 2020 in Sunnyvale. California. So successful, SHIELD T3 expanded to six labs serving customers including the University of Wisconsin, the University of Maine, Baltimore City Public Schools, Washington D.C. public and private schools, and one of the world's largest automotive manufacturers. SHIELD T3 serves over 40 corporations, 10 universities, and several major K-12 school districts.

As of June 2021, SHIELD T3 has run over a million COVID tests across the U.S. The mobile labs allow for local processing of samples and turnaround times of typically around six hours or less, far faster than all other PCR tests and more accurate than most. And the price is the best in the industry. SHIELD T3 continues to evolve, expanding its COVID capabilities and working other individual health opportunities.

As the COVID pandemic is gradually brought under control, SHIELD T3 will shift its operations from COVIDspecific testing to broader opportunities.



Innovation Hub at The 78

DPI is creating the Innovation Hub at The 78. Located in the new development south of Chicago's downtown, the Innovation Hub will be an ecosystem of research activity with a physical presence for DPI in Chicago. There, DPI Science Teams and other research entities will interact and connect with the economic ecosystem. The 500,000-square-foot Innovation Hub is scheduled to open in 2025.

The National Center for Supercomputing Applications and Illinois Ventures have expressed interest in The 78, and DPI will host many others, attracting students, faculty, community organizations, investors, and industry. To make the Innovation Hub a reality, DPI will collaborate with numerous

individuals and offices from the State of Illinois, University of Illinois, City of Chicago, and DPI partner universities, as well as with real estate developers, economic development organizations, professional services firms, corporations, and others.

The State of Illinois committed funding for the building in 2020, and Related Midwest, which is developing The 78, is donating the land for the DPI facility. Jacobs Consultants, Inc. and OMA Architecture were selected for the design of the Innovation Hub, and have started their work. DPI is working closely with Related Midwest, the Illinois Capital Development Board, and Chicago entities such as World Business Chicago to further refine the vision of the Innovation Hub and to make it a reality.

During the next year, DPI's focus will be on the design of the Innovation Hub and on generating interest from companies and others to locate at The 78. ■

Policy

Achieving DPI's talent development, applied research, and business building objectives for Chicago and Illinois will require public policy that enhances the welfare of people and supports innovation and economic development. Evaluating, designing, and implementing good public policy requires evidence-based research that identifies central public interests, problem-solving actions, and barriers to implementation.

One small example of DPI's work in this area is the introduction of a computer science requirement for Illinois high school graduation, recently established by the state legislature. Others may include incentives for hiring practices, or for establishing new businesses.

To evaluate and, if necessary, influence policy, DPI will engage a range of stakeholders, including businesses,

community groups, unions, neighborhoods, industries, and advocacy organizations, in guiding DPI to achieve its objectives and work towards effective and equitable policy.

Goals for Next Year

The goal for next year is to create an office of public policy that will develop partnerships with appropriate community, corporate, governmental, and philanthropic organizations to address specific public policy issues related to DPI's talent, applied research, and business building. This office will also design a public-policy template that includes critical criteria against which the efficacy, equity, disparity, economic impact, and value of all projects, programs, and initiatives of the DPI can be evaluated.





Academic Affairs and Governance

DPI is a strategic initiative of the University of Illinois with an ambitious agenda to make a sizable social and economic impact across the state by educating students in tech, building a large R&D portfolio, and creating tech-based businesses. To be successful, DPI must bring the full power and capabilities of the University of Illinois System to bear and leverage its partner network to deliver an impact that goes beyond the efforts of the individual universities and colleges.

Academic Affairs provides the leadership for and integrity of academic program development and curriculum, and academic policies and procedures. Academic Affairs ensures that DPI and the universities within the University of Illinois System are connected at all

levels of programming. In this way, DPI programs are built together with the faculty, the colleges, and the institutes of the University of Illinois System.

In addition, Academic Affairs ensures the shared governance is done in consultation with the University of Illinois Statutes, the three University of Illinois System campus senates, the University Senates Conference, DPI and University of Illinois System executive leadership, university administrations, and the Board of Trustees.



To be successful, DPI must bring the full power and capabilities of the University of Illinois System to bear and leverage its partner network to deliver an impact that goes beyond the efforts of the individual universities and colleges.

Progress This Year

During this year, three key governance elements were established. Bylaws were written by an ad hoc committee of faculty of the University of Illinois System



Nancy Amato

universities and approved by the University Senates Conference, President Timothy L. Killeen, and DPI Executive Director Bill Jackson in February 2021. Membership in DPI was socialized, and 107 zero-time appointments were approved. The DPI Executive Committee was elected by the DPI membership.

The Executive Committee is the primary governance structure for DPI and it includes faculty from all three University of Illinois System universities. The Committee members were charged by President Killeen and Executive Director Jackson and a meeting cadence was established. Membership of that committee is in the table at right.

In addition to governance, Academic Affairs provides oversight of and consultation for academic program development from across all programmatic units, ensuring alignment of programs with academic policy and procedures of the universities.

Goals for Next Year

Governance objectives for next year include increasing DPI membership by one-third, designing and implementing efficacy and logistics of the Executive Committee, and establishing formal and systematic oversight of academic policy and procedures across DPI units.

Executive Committee Members

Jennifer Bernhard	Director	UIUC
Anne-Marie Hanson	Associate Professor	UIS
Rodney Hopson	Professor of Evaluation	UIUC
Bill Jackson	DPI Executive Director	UI Syster
Jeffrey Eric Jenkins	Professor	UIUC
Ranjan Karri	Chair	UIS
Jerry Krishnan	Associate Vice Chancellor	UIC
Robb Lindgren	Associate Professor	UIUC
Rachel Poretsky	Associate Professor	UIC
Aria Razfar	Professor	UIC
Michael Stroscio	Professor	UIC
Marie Tejero Hughes	Director of Graduate Studies	UIC
Lav Varshney	Associate Professor	UIUC

Department Head

UIUC

Academic Affairs will also design and implement an outreach structure and processes to the University of Illinois System universities to better communicate DPI's initiatives and to encourage broad participation in DPI's work by faculty, staff, and students. The objective is not only to keep the University broadly informed of DPI's activities, but also to furnish opportunities for input and feedback and grow DPI's connectivity across the University of Illinois System. This outreach will use several media and focus on the University's faculty, staff, and administrators.

Development

Philanthropy is a key component of DPI's success, enabling the establishment, expansion, and sustainability of priority initiatives across DPI's programmatic units. Fundraising activities are coordinated with the DPI Executive Director, DPI program leaders, the University of Illinois Foundation, and other advancement staff across the University of Illinois System. We aim to build a robust web of philanthropic relationships that provide sustainable support for the people, programs, and spaces needed for DPI to achieve its ambitious goals.

Financial support comes from principal gifts, via peer and leadership networking; major gifts and grants, directly solicited via DPI fundraisers; and DPI-related gifts, via collaborations with university advancement partners. Generating an ongoing stream of gifts to support DPI's operations requires building a case for DPI's support, providing engagement opportunities for DPI prospects and donors, and raising DPI's profile across personal and professional networks. This is a collaborative effort between the DPI Director of Development, program leaders, and DPI-affiliated faculty, to both connect alumni and friends with DPI activities and to pursue a wide range of foundation and corporate gifts/grants.

In FY 2021, philanthropic commitments to DPI total more than \$12 MILLION.

Progress This Year

Philanthropic commitments to DPI total more than \$12M in FY 2021, with support from individuals,

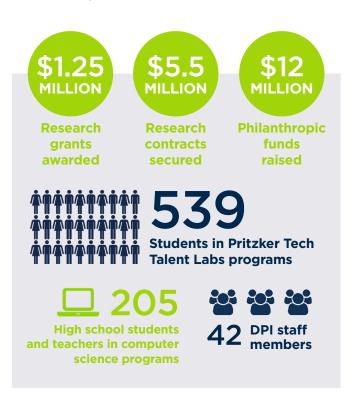
Discovery Partners Institute 23 Annual Report 2020-21



Key Performance Indicator	Year 1 Target (FY20-21)	Year 1 Achievement (FY20-21)	Year 5 Target (FY25-26)		
Pritzker Tech Talent Labs Workforce Education					
Number of undergrad students participating in High-School-to-Career Pathways programs	150	137	650		
Percent of undergrad High-School-to- Career Pathways program participants underrepresented backgrounds	Establish baseline by major and underrepresented group	40% from underrepresented groups is our target	50% representation		
High-School-to-Career Pathways participants Illinois job placement rate	10% higher than placement rate of comparable groups	We are establishing a data platform to track and measure outcomes	26% higher than placement rate		
Number of learners participating in upskilling programs	600	402	2250		
Upskilling Program Satisfaction (course evaluations, job placement survey)	10% higher satisfaction rate compared to non-PTTL coursework	Plan to use the Net Promoter Score to measure satisfaction (Target 60+)	35% higher satisfaction rate		
Pritzker Tech Talent I	abs Community	Education			
Number of student participants in student programs	150	170	1000		
Number of teacher participants in teacher programs	50	35	200		
Applied Research					
Number of Science Teams	10	9	75		
Research grants (\$ millions)	5	1.25	100		
Contracted research (\$ millions)	5	5.5	100		
Business Building					
Start-ups housed	-	3	20		
Cumulative start-up funding (\$ millions)	-	-	100		
Corporate innovation facilities located at/near DPI	-	-	15		

Progress against Objectives

To measure progress, DPI has set challenging targets for the next five years. Even under the stress and limitations of the COVID pandemic, we have made significant progress. We have built a team of 42 DPI staff members, launched new programs, established nine Science Teams, and started design of the Innovation Hub at The 78.



On balance, DPI made significant progress against the targets for the year. Not all targets were met, but some were exceeded (see details in table at left). We remain confident that we can achieve our long-term targets.

Appendix: The Team ——

Executive Director Jackson, William Executive Director

Community Education Harris, Mark Director of Community Education
Freeman, Charity Associate Director, Teacher Training
Grant, Gina Associate Director, K-12 Programs

Monelle, Kay Visiting Assistant Director, Student Programs

Pritzker Tech Talent Labs Casselle, Omowale Director of Pritzker Tech Talent Labs

Clark, Danielle Associate Director of Pritzker Tech Talent Labs

Bennett, Michael Director of Immersion Programs

Larson, Karen Associate Director, Immersion Programs

Foil, Jennifer Director of Workforce Education

Diamond, Morgan Associate Director of Workforce Development Lugo, Eric Director of External Relations, Talent Programs

Palid, Olivia Visiting Research Associate

IWERC Bates, Megan

Bates, Megan Director of Illinois Workforce Education Research Collaborative

Werner, Stephanie Postdoc Research Associate
Wang, Yi Postdoc Research Associate
Amechi, Mauriell Senior Research Associate

Cashdollar, Sarah Research Specialist

Applied Research and Development Venkatakrishnan, Venkat
Catlett, Charles
Jung, Chunyong
Clements, Laura
Director of Research
Senior Research Scientist
Postdoc Research Associate
Visiting Senior Project Manager
Postdoc Research Associate

Donne, Jeffrey Corporate Engagement Lead, Research and Development

Fitzsimons, Michael Associate Director, R&D Programs Lieway, J Garpue Grants and Contracts Associate

Ventures Flavin, Michael

Special Advisor to the Executive Director

Staff

Baker, Phyllis Director of Academic Affairs Kelley, Michael Director of Development

Scott, Lauryn Assistant Director, Marketing and Communications

Clarke, Annabelle Director of Administration

Anderson, Adriann Senior Coordinator, Business Operations

Lampela, Marcia Site Manager

Lozano, Eva Office Administrator Wisehart, Mandy Administrative Aide

Lopez, Lupita Events & Social Media Coordinator
Staten, Katherine Associate Director, Contact Tracing
Davis, Stephanie Contact Tracing Management Director
Bogaert, Frank Special Advisor to the Executive Director

Cheng, Joe DPI Partnerships
Khanna, Pradeep DPI Internal Relations

Solow, Alan Special Advisor, External Relations



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