

A large, modern glass and steel building, the Dell Medical School, is the central focus of the image. The building features a prominent glass facade that reflects the sky and surrounding environment. The structure is multi-storied and has a complex, angular design. In the foreground, there are some trees and a large, ornate sculpture. The sky is a clear, bright blue.

# DELL MEDICAL SCHOOL IMPACT ON INNOVATION: BIOMEDICAL AND LIFE SCIENCES

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# INNOVATION REPORT

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## Introduction

This report by the Bureau of Business Research (BBR), an organized research unit of the IC<sup>2</sup> Institute at The University of Texas at Austin, examines the impact of Dell Medical School at UT Austin, particularly in the context of Austin, Travis County, and the five-county Central Texas region. The report includes quantitative and qualitative impact with the goal improving awareness and understanding of select data, programs and progress among a broad set of work.

The BBR team engaged an external advisory group not affiliated with UT Austin to review this report, as well as to provide input and recommendations for sources of secondary research data to help capture impacts. Their participation in the study is limited to an advisory role and their contributions imply no endorsement of findings. Participants included:

- Dr. Desmar Walkes, Director, City of Austin Medical Director/Health Authority
- Dr. Lisa McDonald, Director of Healthcare, Austin Technology Incubator, UT Austin
- Dr. Cindy WalkerPeach, Former Chief Product Development Officer, Cancer Prevention & Research Institute of Texas, National NIH & NSF I-Corps Faculty
- Dr. David Warner, Wilbur J. Cohen Professor in Health and Social Policy and Professor of Public Affairs, LBJ School, UT Austin

### *Dell Medical School*

In 2014, The University of Texas at Austin launched Dell Medical School, the first medical school to be built from the ground up at a top-tier research university in nearly 50 years.

In 2015, Dell Med took over its first residency program in collaboration with Ascension Seton, building on the foundation of residency programs already in place in Austin. The first class of 50 medical students arrived in the summer of 2016, and in 2020 Dell Med received full accreditation allowing it to graduate its inaugural class. ([Read more on Dell Med's history here.](#))

In 2015, Dell Med articulated its mission and vision:

**Mission:** To revolutionize how people get and stay healthy by:

- Improving health in our community as a model for the nation;
- Evolving new models of person-centered, multidisciplinary care that reward value;
- Accelerating innovation and research to improve health;
- Educating leaders who transform health care; and
- Redesigning the academic health environment to better serve society.

**Vision:** A vital, inclusive health ecosystem.

Eight years later, the multifaceted Dell Medical School enterprise includes more than 1,200 full- and part-time faculty and staff, 13 academic departments; 12 centers and institutes; a research program of nearly 100 investigators working on more than 200 research projects; the UT Health Austin clinical practice of more than 60 primary, walk-in and specialty clinics, as well as adult

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and pediatric partnerships with Ascension Seton and Dell Children's Medical Center; medical education for 200 students; more than 400 residents and fellows providing care across 46 specialty programs in collaboration with co-sponsor Ascension Seton; and many other core activities spanning the school's four areas of work spanning education, research, clinical care and the healthscape, an area of work focused on health beyond clinics and hospitals.

This report, "Dell Medical School Impact on Biomedical and Life Sciences" focuses on Dell Med's health product innovation impacts from quantitative and qualitative perspectives.

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## Executive Summary

Innovating new ideas, products and technologies is a key goal and among the top outcomes of any medical school. When it launched in 2014, Dell Med's inaugural dean talked often about innovative new approaches to its life sciences, education and community health initiatives. The BBR research team has employed a mixed-methods approach to analyzing, quantifying and presenting innovation outcomes from Dell Med. This report is a synthesis of interviews (see Appendix for interview list) with key personnel at Dell Med and UT Austin involved in translating research into innovations that can be commercialized, as well analysis of data provided by UT Austin's Office of Technology Commercialization. By exploring quantitative data and qualitative responses from key stakeholders, an important role for Dell Med is defined in the innovation ecosystem both on the UT campus and in Central Texas. Further, the case study presented in this report, plus findings from the Central Texas Life Sciences focus group and an associated survey, illustrate the impact that Dell Med has already had in just over eight years since its launch.

## Key Findings

- **Research Funding and Collaborative Projects (2015-2021)<sup>1</sup>**

The Medical School has attracted \$96.5 million in total extramural research funding where Dell Med faculty served as Principal Investigator (PI). Funding has grown in absolute dollars and project numbers each year.

  - \$51 million (Federal)
  - \$39.6 million (State of Texas)
  - \$5.9 million (Clinical trials and private grants)
- **Inventions, Patents & New Technologies (2015-2021)<sup>2</sup>**

There have been 143 invention disclosures with Dell Med faculty or students listed as inventors. These have translated into 77 provisional patents, 45 utility patent applications, and 12 issued patents to date. Twelve existing companies and five newly formed companies have executed licenses for Dell Med-associated technology.
- **Higher-than-expected Innovation Outcomes**

Comparing cumulative grant funding with filed invention disclosures showed a 4-fold higher number of disclosures involving Dell Med when compared with expectations based on published reports and national averages.<sup>3</sup>

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<sup>1</sup> Source: The University of Texas at Austin Office of Sponsored Projects (OSP)

<sup>2</sup> Source: The University of Texas at Austin Office of Technology Commercialization (OTC)

<sup>3</sup> <https://www.ipwatchdog.com/2018/01/04/autm-licensing-survey-eroding-patent-rights/id=91647/>  
<https://autm.net/surveys-and-tools/surveys/licensing-survey/2019-licensing-survey/patents>

Caviggioli et al., 2020. Tech. Forecast. Soc. Change. 159:120189. <https://doi.org/10.1016/j.techfore.2020.120189>

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- **Higher-than-expected Impact of Collaborations with Other UT Austin Colleges & Schools:** Adding estimated collaborative grant totals involving Dell Med but having a Principal Investigator in another UT Austin college or school continued to show significant excess invention disclosures – 3.5 times more than expected based on published reports.
- **Promising New Models:** The signature Painstorming process and the Texas Health Catalyst program, both part of the CoLab @ Dell Med, are example of promising new approaches to support innovator teams navigating the complexities of commercialization. These initiatives:
  - Engaged innovators at Ascension Seton, Dell Med and UT Austin Colleges and Schools to produce >460 programmatic applications between 2016 and 2020.
  - Leveraged >5,000 hours in community mentor advising time to assist UT innovation teams, valued at >\$1.2M @ \$250/hour consulting rate.
  - Awarded >\$800,000 in seed funding to UT innovators.
  - Responsible for higher-than-expected invention disclosures (compared with research funding levels) because of their ability to initiate cross-campus collaborations.
- **Return on Investment (ROI):**
  - Seed funding for UT innovators through the Texas Health Catalyst program has generated significant ROI: \$61 in next-stage funding for each dollar invested.

**Innovation Impacts**

**Dell Medical School Innovation Engagement**

*Research Funding*

Research funding is key to driving innovation – it is fuel for the innovation process. Funding from federal, state, foundation and private sources for research conducted at Dell Med has been rising steadily since 2015. The data presented below were provided to the BBR research team from Dell Med and from the Office of Sponsored Projects (OSP) at UT Austin.

Total federal and state extramural funding for FY2016 – FY2021(9/1/2015-8/31/2021) came to \$90,610,167.<sup>4</sup>

Total federal funding:	\$50,955,389
Top Departments, by number of grants:	
• Psychiatry:	11 grants totaling \$13,338,348
• Neurology:	7 grants totaling \$3,052,538
Total state funding:	\$39,654,779
Top Departments, by number of grants:	
• Population Health:	6 grants totaling \$1,148,138
• Medical Education:	5 grants totaling \$16,918,107

It should be noted that joint funding between Dell Med faculty and other faculty on the UT Austin campus is not included in these totals if the Principal Investigator was not appointed to Dell Med. So, total extramural funding through collaborative research is expected to add significantly to this total.

Funding for clinical trials performed at Dell Med are an additional source of research funding and can come from both public and private sources:

Clinical Trial Funding:	\$5,882,396
• 55 programs	
• 39 Industrial funded programs	

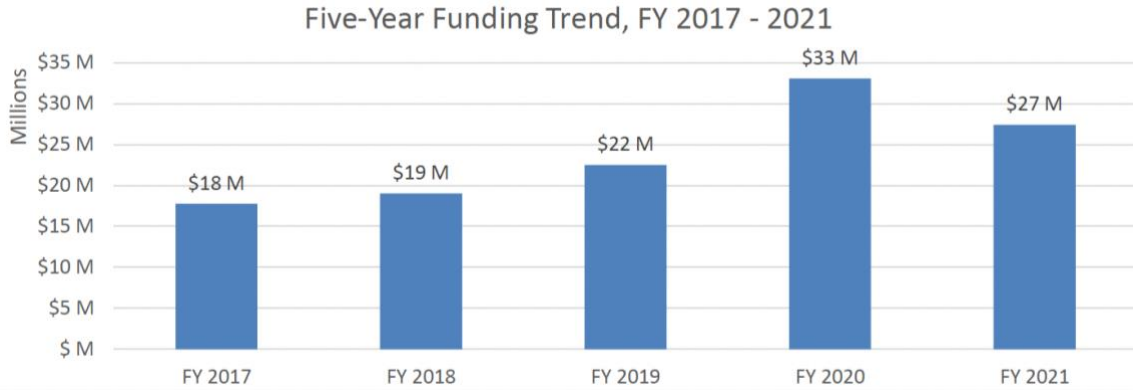
Top Departments, by number of clinical trial agreements:	
• Medicine:	17 projects
• Oncology and Livestrong Cancer:	10 projects
• Psychiatry:	10 projects
• Neurology:	8 projects
• Surgery:	5 projects

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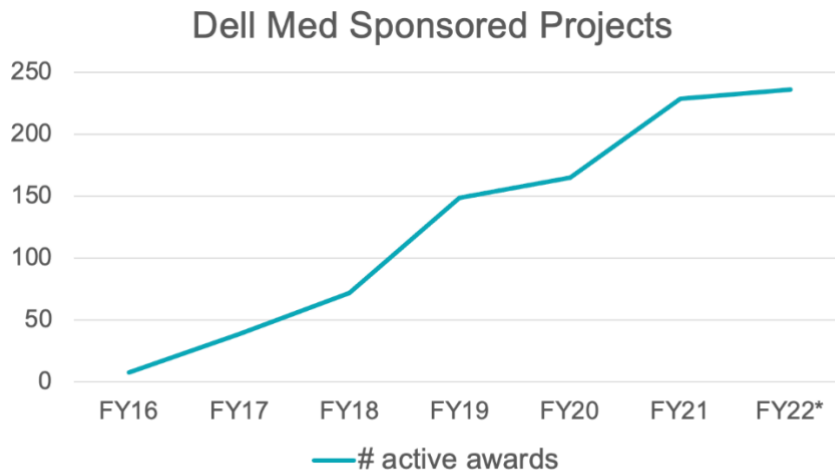
<sup>4</sup> Data generously provided by the Office of Sponsored Projects, UT Austin, Dec. 16, 2021.

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Total funding of extramural and clinical-trial funding for Dell Med is \$96,492,563. Dell Med has characterized the growth of research grant award amount as illustrated in the Figure 1 below as well as the increase in total sponsored projects in Figure 2.<sup>5</sup> The negative change in absolute funding level observed in FY2021 may be attributed to various factors associated with the Covid-19 pandemic. However, additional research would be necessary to confirm root cause.



**Figure 1.** Dell Med research award and funding totals for FY17-21. Data provided by OVRP Office of Sponsored Projects.



\* Projected based on FY22 budget and previous relationship between budgets and actuals

**Figure 2.** Total number of Dell Med sponsored projects for FY16-21 and estimated for FY22. Image taken from footnote 5.

Data were not available for collaborative grant funding where Dell Med faculty or clinicians are involved, but the Principal Investigator is from another UT College or School. It is estimated that

<sup>5</sup> Dell Medical School: Research Planning FY2020-2023 Feb. 7, 2020; Dell Medical School Research Report PowerPoint



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10-20% additional research funding may be provided to the medical school through such collaborative grants<sup>6</sup>, totaling \$9-18M over the study period.

Collectively, these data show strong growth in grant and sponsored project funding, with a slowdown in FY21 thought to be attributable to disruptions caused by the onset of COVID-19.

### *Commercialization Metrics*

The UT Austin Office of Technology Commercialization analyzed innovation productivity of faculty and students appointed to Dell Med.<sup>7</sup> This analysis includes Dell Med-only and Dell-Med/UT Austin campus collaboration-based inventions. The summary is provided below:

1. Invention disclosures filed containing Dell Med faculty and/or students as inventors: 143
2. Patent applications containing Dell Med faculty and/or students as inventors:
  - a. Provisionals: 77
  - b. Conversions to utility patents; 45
  - c. Issued patents as of October 2021– US and international: 12
3. License agreements emerging from IP including Dell Med faculty and/or students as inventors: 12
4. University-associated startups emerging from IP including Dell Med faculty and/or students as inventors: 5

How do these innovations outcomes compare with other research universities? Innovation metrics and outcomes are generally calculated based on the amount of research dollars spent at academic institutions.<sup>8</sup> Review of national averages reveal: \$2.6M in extramural funding is required to produce an invention disclosure; ~50% of invention disclosures being subject to provisional patenting; 67% conversion of provisional patents into utility patents; and 37% of patent filings are subject to licenses by academic technology transfer offices. Since absolute numbers in research funding varies between institutions, percentage conversions provide the best basis for comparison. Since 2015, Dell Med has produced 143 invention disclosures with 53% being developed into provisional patent filings, conversion of 58% of provisional applications into utility patents, and 38% of patent protected technologies being subject to license agreements (existing companies and startups combined). These values compare well with national averages,<sup>9</sup> indicating strong efficiency of the Dell Med-associated value chain at UT.

The key deviation is the enhanced number of invention disclosures from predicted (34) from the total of Federal and state grant funding with Dell Med faculty as Principal Investigators (\$90,610,167 in extramural funding divided by \$2.6M/invention disclosure based on national averages), compared with observed (143) disclosures based on national averages. The innovation outcome from Dell Med was >4x higher than what we should expect to see using these metrics.

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<sup>6</sup> Personal communication from Lindsey Demeritt M.S. and Dr. Steve Strakowski.

<sup>7</sup> Data generously provided by the Office of Technology Commercialization, UT Austin, Dec. 8, 2021.

<sup>8</sup> <https://www.ipwatchdog.com/2018/01/04/autm-licensing-survey-eroding-patent-rights/id=91647/>  
<https://autm.net/surveys-and-tools/surveys/licensing-survey/2019-licensing-survey/patents>

Caviggioli et al., 2020. Tech. Forecast. Soc. Change. 159:120189. <https://doi.org/10.1016/j.techfore.2020.120189>

<sup>9</sup> Ibid

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Integrating estimated collaborative grant totals with Principal Investigators outside of Dell Med (maximum of \$18M estimated, see comments above provided by footnote 6), ~7 additional invention disclosures would be expected based on national averages. This would be a total of 41 expected invention disclosures. The 143 actual invention disclosures are 3.5-times higher than the maximum expected from all grant funded sources.

These data suggest that Dell Med collaborations outside of direct research funding with campus probably enhance the number of invention disclosures involving Dell Med faculty and students. Collaboration impact could be in the form of funding or joint invention. The innovation culture fostered in Dell Med would be expected to make significant contributions due to the type of person hired, the researcher's medical discipline and the nature of outcome. Further, engagement of Ascension Seton clinicians who are collaborating with Dell Med on innovative research with UT campus faculty can add to innovation outcomes. Finally, the impact of the collaborative innovation encouraged by Dell Med's culture and health product innovation programs, such as Texas Health Catalyst, are hard to ignore but difficult to quantify. The cross-campus collaborations and funding incentives promoted through such programs may promote more innovation and translate to higher invention disclosure numbers than expected based on extramural funding levels.

### *Best-Practice Innovation*

One aspect that will require further investigation and development is the nature of different innovations and how they are effectively commercialized at UT Austin. Through our interview process, we noted two different types of product innovation happening in association with Dell Med:

Traditional innovations – primarily protected by patents:

- Licensing to and development of a startup entity; or
- Licensing to an established company.

Best-practice innovations – generally not patentable:

- Incorporation into clinical or medical practice; or
- Adoption of a model or system into community practice.

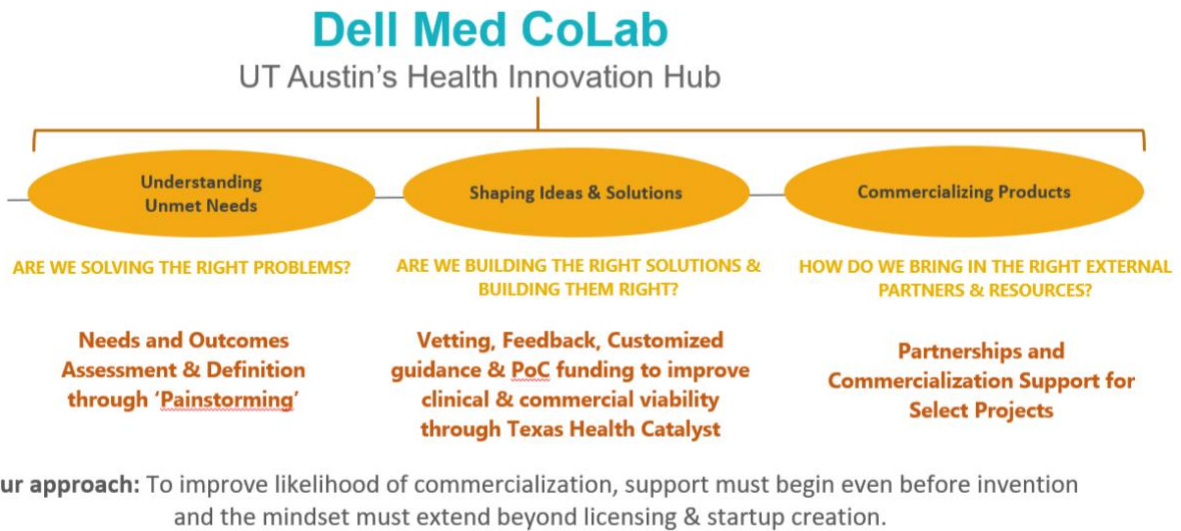
Indeed, review of other schools and colleges reveals that innovations from other disciplines can fall into each of these categories as well. Traditional innovations generally translated into startup or existing company licensing agreements. Whereas best-practice innovations translate into clinical or organizational practice or into community use or application. The discussion below will focus on traditional innovations that are readily packaged as intellectual-property-protected assets.

**Key Innovation Assets**

Key Dell Med programs supporting research and product innovation at UT Austin are presented below. We describe their scope and quantify their impact when possible. We also describe their connections with other programs or units on the UT campus. Figure 3 describes the innovation work of the CoLab @ Dell Med.

The CoLab, which positions itself as the hub for health product innovation at UT, offers technology accelerator services like Texas Health Catalyst and Painstorming, has a broad view of problems and solutions – field, source and application. The Partnership and Commercialization layer of the CoLab’s services provide on-going support for the most promising innovations and associated faculty and students– identifying and shepherding follow-on funders, strategic partners, out-licensing of UT IP, launching new companies, and generating new avenues for future research funding. Rather than offer physical laboratory space to new companies, the CoLab stimulates collaborations between Dell Med and other UT Austin faculty and students to enhance organic product innovation that promotes new grant funding and a pathway to commercialization.

**A Holistic Approach to Commercialization:  
From Need to Impact**



**Figure 3.** CoLab @ Dell Med strategy to support health product innovation commercialization.<sup>10</sup>

The programs offered at Dell Med offer important contributions to the UT innovation system. Most UT programs focus on innovation – solution to market-fitting and subsequent business model generation. Few UT programs reach back to ideation and problem definition using human and system-centric design, and UT offers a limited number of programs offering developmental resources and funding to accelerate potential solutions into market-ready prototypes. Dell Med

<sup>10</sup> Shared by Dr. Nishi Viswanathan 01.10.21

programs highlight the importance of a comprehensive system of product innovation – working from problem definition through innovation to market-ready testing.

The CoLab is Dell Med’s primary program to enhance the realization of health product innovation from problem definition to solution fitting and improvement, and finally to commercialization support. It is also an important catalyst for cross-campus collaborations.

**Indeed, we believe that CoLab is responsible for higher-than-expected invention disclosures (compared with research funding levels) because of its ability to initiate cross-campus collaborations.** Functions of the CoLab are detailed in Figure 3.

Presented below are two cases studies on CoLab programs, “Painstorming” and “Texas Health Catalyst.” Both cases yield important insights into Dell Med’s contributions to UT Austin’s innovation ecosystem and the fast-growing biosciences sector in Central Texas.

### **Painstorming Case Study**

Problem identification is the first step of commercialization. As Einstein is reported to have said, “If I had only one hour to save the world, I would spend fifty-five minutes defining the problem, and only five minutes finding the solution.”<sup>11</sup> Unfortunately, most innovation systems start with technologies that are then used as the start – and innovators must find a problem that the tech can solve. In other words, programs often start with a bag of hammers all looking for a nail.

Uniquely, however, Dell Med has built a program to start the commercialization process with proven clinical problems or pain points.

The CoLab team proactively engages clinicians at Dell Med and Ascension Seton, the school’s clinical partner, to identify key problems they face on a regular basis. This engagement was formulated as a process known as **Painstorming**. Clinicians or clinical actors offer problem definitions and the healthcare worker who offers the best-defined problem is awarded a cash reward. Key learnings from this pilot program are: 1) small financial awards create engagement; 2) problems are all around – but rarely recognized as in need of solution without explicit engagement; and 3) interesting problems surface from such competitions that can be the basis for innovation programs involving broad sets of campus faculty and students.

### *Summary*

- Painstorming is a promising new model for identification of deep market needs in healthcare.
- Ascension Seton and Dell Med healthcare providers, UT faculty, medical school residents and students, and others submitted 107 problem applications in response to “Healthcare’s Biggest Challenge” competition.
- After a defined review process, 11 finalists were selected, and “Healthcare’s Biggest Challenge” was awarded (along with a \$5000 prize) to the problem best aligned with Dell Med and its mission.
- A detailed Painstorming session engaged campus and community experts in healthcare practice, venture funders, regulatory practice, technology and other leaders to define a

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<sup>11</sup> <https://kingslan.com/newsletters/einstein.pdf>

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detailed blueprint for solutions fitted to the selected problem. This solution blueprint has drawn entrepreneurs from Central Texas to engage in product building.

- Key benefits were identified as well as future opportunities, including integration of this program across the UT Austin ecosystem and leveraging additional funding sources to create more programmatic and solution impact.

### *Problem*

Knowledge and functional silos are the principal barrier for healthcare innovation. Practitioners, technologists, and entrepreneurs all bring different expertise and perspectives to healthcare. Technologists and entrepreneurs see clinical practice through a window that lacks full clarity to understand clinical realities. Clinicians may choose to “live with” and “accommodate” problems due to ongoing workload and struggle to understand commercial constraints for solutions to clinical problems. Ruben Rathnasingham, Ph.D., who directs CoLab, says that “a close look at the health care start-up graveyard reveals that many entrepreneurs fail because they start with an assumed solution and ‘try to force-fit it into a perceived problem.’ This results in product-market mismatch and an unclear path to market.”<sup>12</sup>

### *Strategy*

In 2019, the CoLab devised and launched the “[Healthcare’s Biggest Challenge — What’s Your Problem?](#)” program<sup>13</sup> – also called Painstorming. To participate in the program and possibly win the \$5,000 award for “best” problem, the team asked a simple question: “What problem in health care could lead to significant impact if solved?”<sup>14</sup>

Nishi Viswanathan, MBBS, MBA, former lead for the program said:

“We initially went down a different path and consulted with individual clinicians about top-of-mind problems, but then we started thinking, what if we could use all the great expertise at Dell Med to crowdsource the identification and framing of a problem? Ideally, we would like to not just define the pain point, but also discover constraints that innovators must consider when designing a product.”

Problems were sought – no associated solution was required, and applications came rolling in. Problem statements were reviewed and the “Biggest Challenge” was awarded to Meghana Gadgil, M.D., MPH, an assistant professor in Dell Med’s Department of Population Health, who described the recurrent problem of relaying critical patient information during handoffs between clinicians, shifts and facilities as health care is provided. The inefficiencies of information handoffs cause many problems, waste lots of time, create more expensive diagnosis and treatment due to repeat actions, and ultimately put patient’s health and lives at risk.

### *Broad Interest*

Clearly, the 107 submissions and broad fields of interest indicated effective outreach among different medical groups and practitioners. A wide variety of problems surfaced from disparate

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<sup>12</sup> <https://dellmed.utexas.edu/blog/whats-your-problem>

<sup>13</sup> [https://utexas.qualtrics.com/jfe/form/SV\\_cD39j6RO6aaeKHP](https://utexas.qualtrics.com/jfe/form/SV_cD39j6RO6aaeKHP)

<sup>14</sup> <https://dellmed.utexas.edu/blog/whats-your-problem>

medical fields, complexity, and potential solution requirements. The CoLab reported these submission data:<sup>15</sup>

- 34% of Painstorming submissions focused on healthcare affordability and access. Examples include improving price transparency and improving patient-provider matching.
- 30% addressed gaps in care, delivery, and monitoring. Examples addressed the lack of effective, remote, home-based, supervised rehabilitation programs for cancer surgery patients, and the need to evaluate, manage and rehabilitate patients suffering from dysphagia.
- 19% engaged issues with data and health records. Examples include the need for interoperability, data exchange and data visualization tools in EMR systems as well as need to enhance access to comprehensive health information about patients with congenital heart disease.
- 17% identified gaps associated with diagnostics and medical devices. Examples include need for new technologies for blood monitoring to fit needs of patient suffering from neuropathic pain in the hands, and loss of access to catheter guidewires during procedures.

### *Creating a Solution Blueprint*

The program did not stop at the award. The CoLab team invited Dr. Gadgil and other experts to Painstorm,<sup>16</sup> or look at the chosen problem from a clinical, regulatory, reimbursement, policy and business perspectives to generate clear understanding of actual need and how solutions would fit into the medical system. In other words, the goal was a solution blueprint to guide innovators. Dr. Viswanathan described the process:

“We decided to flip this and give innovators a target to aim for. The Painstorming session was a great way to start digging into the intricacies of the problem. Someone looking at solving the problem could get an in-depth understanding of all its facets and would now be equipped to design a better solution.”

To effectively Painstorm, an excellent innovation facilitator was needed. Kerry Rupp, general partner at Austin-based True Wealth Ventures and National Science Foundation I-Corps faculty member, led the process – allowing the team representing patients, hospitals, technologists, and entrepreneurs to assemble the needed information to define the actual problem from multiple perspectives, clarify constraints on solutions from use and adoption perspectives, and create a descriptive minimum viable solution to guide innovators. The problem “owner,” Dr. Gadgil commented<sup>17</sup>:

“By thinking broadly about transitions and handoffs, we saw many facets of the actual problem. The inclusion of industry and health care administrators in the room enhanced the discussion, as these are not viewpoints that clinicians are typically exposed to.”

### *Taking the Translational Step*

The Painstorming outcome has moved beyond a concept to a commercial transition strategy. A successful serial entrepreneur, who recently exited a company, connected with the CoLab to find

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<sup>15</sup> Personal communication Dr. Nishi Viswanathan January 10, 2022.

<sup>16</sup> <https://medium.com/@alyciadoxon/brainstorming-methods-pt-2-pain-storming-80cd1fc50d4b>

<sup>17</sup> <https://dellmed.utexas.edu/blog/dissecting-patient-handoffs-a-painstorming-exercise>

an opportunity to impact healthcare. The question was – where to start? The CoLab team presented the Painstorming problem and solution blueprint to the entrepreneur and team composed of business, finance, health tech, and automated intelligence experts. The problem and solution blueprint interested the team and the CoLab initiated a collaboration with the entrepreneur to explore an optimal solution through engagement with medical providers and industry partners.

It was first learned that in an era of COVID, with increasing demands for remote care, the problem/solution blueprint was of particular interest and showed commercial promise. Indeed, interviews identified telemedicine as the first point of entry for the problem/solution fit. The CoLab has continued to work with the entrepreneur and his team’s expertise in natural language processing technology to build an automated solution comprised of hand-off summaries for telemedicine visits, actionable information for patients, and clinician-oriented visit summaries – all to be added to the primary electronic health record. To date, the collaborative team has engaged in beta testing of the new tool in artificial telemedicine visits using actors to test the technical feasibility of the product. Further, the collaborative team has spoken to several telemedicine companies who could be potential co-development partners. This experience has shown that linking Painstorming outcomes with the CoLab’s entrepreneurial network can turn problems into potential products.

### *Key Insights*

The Painstorming process revealed a few key insights:

1. Crowdsourcing problems works. Clinicians and different types of medical practitioners can offer deep understanding of medical problems. Providing clinical staff and practitioners incentive to review medical practice, personal experiences, and patient vignettes reveals key gaps in healthcare. Raising attention to gaps can stimulate discussion – by sourcing or adapting already-available technology for solutions or beginning an innovative journey to define a new solution.
2. “A well-stated problem is half-solved.”<sup>18</sup> The Painstorming process validated the effectiveness of problem definition as the critical starting point for innovation. Improved problem definition led to new insight and a roadmap for solution creation.
3. Problem definition is not enough. Innovations in healthcare often fail due to the need to fit the requirements of multiple stakeholders – patients, physicians, hospitals and clinics, payers, and commercial entities. The group Painstorming session allowed the multiple perspectives to be presented and a reasonable blueprint for solutions to fit all needs was defined.
4. Networks offer multiple benefits. Worthy problems stimulate talent to network with university innovators to increase the efficiency and effectiveness of the commercialization process. Universities want industry and thought leaders to provide “free” mentorship for innovators. The cost of time and attention for this participation is often not considered. However, validating an urgent, real-world problem provides strong

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<sup>18</sup> [https://www.brainyquote.com/quotes/charles\\_kettering\\_181210](https://www.brainyquote.com/quotes/charles_kettering_181210)

motivation for leaders to give time from their busy schedules and their expertise to benefit the university as solutions are defined or created. Further, the expert network can provide pathways for the talent, team, and market and money access to actively pursue a solution.

### *Community Opinion*

Community participation in the review of submitted problems and the actual Painstorming session is a testament to the interest private physicians, venture capital leaders, regulatory experts, and experienced entrepreneurs had in the program. A community physician noted that the program was very successful and initiatives to extend participation to other Central Texas healthcare groups should be considered. The importance of having a solution fitted to a real problem was reiterated by a leading Central Texas entrepreneur in the medical device space. In the expert's opinion, going for equity first is a mistake – readiness, valuation, focus and other issues can follow this approach. Data is critical and demonstrated fit to medical problem/use. This reduces risk and enhances equity and value. It appears that Painstorming fits into this process well. An established biomedical entrepreneur supported the program but noted that the financial incentive for clinician engagement appeared much too small. Their schedules are quite busy and expertise is valuable – asking them to go through problem discovery processes requires lots of time and no immediate return on investment. He recommends larger financial incentives as awards for participation.

### **Texas Health Catalyst Program Case Study**

Starting a new medical school as part of a Tier One research institution is a rare opportunity. How can the medical school enhance the reputation, funding, and innovation outcomes of the university? Further, as innovation in health and healthcare is a key goal for Dell Med, how can innovations developed enter the market to improve health? Since 2015, Texas Health Catalyst has sought to “facilitate transformative innovation for the biggest problems in health care by accelerating the journey from bench to bedside and emphasizing ideas that improve health care value.”<sup>19</sup> The Texas Health Catalyst team collaborates broadly across the UT campus, but most intensely with faculty in the Cockrell School of Engineering, College of Natural Sciences, and College of Pharmacy. It engages with a variety of offices and well-established campus programs, including the I-CORPS™, Austin Technology Incubator, and the Office of Technology Commercialization in the Office of the Vice President of Research.

### *Summary*

- Texas Health Catalyst demonstrated a proven approach to stimulate campus and community healthcare collaboration by:
  - Engaging innovators at Ascension Seton, Dell Med and UT campus colleges and schools to produce 360 programmatic applications between 2016 and 2020.
  - Leveraging >5,000 hours in community mentor advising to assist UT innovation teams, valued at >\$1.2M @\$250/hour consulting rate.
  - Awarding >\$800,000 in seed funding to UT innovators.

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<sup>19</sup> Viswanathan and Gadgil. 2020. NEJM Catalyst Innovations in Care Delivery. <https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0518>



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- Seed-fund recipients raised >\$49M in follow-on support: each \$1 in seed funds provided by Dell Med was multiplied to \$61 in next-stage funding.
- The high numbers of collaborative projects engaged suggests Texas Health Catalyst makes significant contributions to Dell Med’s overall innovation invention disclosure outcomes, which are 4-fold higher than expectations based on national averages.

### *The Problem*

Commercialization of innovations offers significant reputational and revenue benefits for universities and constituent medical schools. Innovations from UT Austin have indeed changed the world, from 3-D printing, Li-ion batteries, advanced glucose monitoring, safer opioid products, and improved archival data systems, to name but a few<sup>20</sup>. Recent research led by Dr. Jason McClellan identified a stable pre-fusion form of the SARS CoV2 Spike protein that was integrated as the target antigen for mRNA vaccines to prevent COVID-19. This innovation has generated much attention, awards, and broader impacts for UT<sup>21</sup>. Healthcare innovation is remarkably complex – requiring a multi-site, multi-institutional approach to fit an innovation into clinical use, intellectual property (IP) protection requirements, Federal regulatory oversight, insurance reimbursement practice, as well as commercial incentive. A virtual “village” of expertise is required to fit and translate healthcare innovations from concept to market.

### *The Strategy*

Texas Health Catalyst was conceived with the complexities of health product commercialization in mind. The program effectively creates multi-disciplinary teams – of basic scientists, engineers, clinical practitioners, and engages these with experts in IP, insurance, clinical practice, regulatory science, funding and entrepreneurship. This network approach offers broad insight to shape innovations for clinical utility and commercialization fit.

The program encourages innovators to address clearly defined unmet healthcare needs, uses its application process and mentor network to accelerate viable solutions to funders and market. The outcome is definition of key milestones or a commercially relevant developmental inflection point that will attract funding, partnership and other needed resources to promote product realization.

Texas Health Catalyst has two Phases<sup>22</sup>:

1. Phase 1 (Consulting Award): Application to be selected for customized guidance from clinical and industry experts to get feedback about clinical and commercial viability of proposed innovation, define the most attractive commercialization pathway, identify key milestone or inflection point, and identify funding opportunities and next steps to attract investors and commercial partners.
2. Phase 2 (Funding Award): Completion among finalists to receive \$5,000 to \$50,000 in seed funding to achieve specific milestones and outcomes defined by consulting phase. The funds are to accelerate design and development of the solution to be attractive to commercial partners and investors.

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<sup>20</sup> <https://news.utexas.edu/2014/09/08/five-great-ut-ideas/>

<sup>21</sup> <https://news.utexas.edu/2020/12/01/texas-coronavirus-scientists-win-award-for-research-with-great-societal-benefit/>

<sup>22</sup> <https://dellmed.utexas.edu/healthscape/collaborative-opportunities/colab/texas-health-catalyst/application>

### *Impact*

Texas Health Catalyst began in 2015, with the first cohort completing the program in 2016. From 2016-2020<sup>23</sup>, the program received more than 360 applications for Phase One of the program.

Applications are distributed through several different healthcare interventions:

- 32% Digital health and/or software
- 27% Medical devices
- 21% Therapeutics, and
- 20% Diagnostics.

From the 360 applications, 77 teams received Phase One consulting awards. These teams were provided access to a network of ~350 mentors with clinical, regulatory, IP, reimbursement, and industry expertise. External reviewers and mentors have donated >5,000 hours of service to the program and UT innovators. Further, the Catalyst team has engaged 32 UT students to assist with research and other functions to support teams. Of the 360 applications, 25% were submitted by teams composed of faculty from more than one UT College or School, with the Cockrell School of Engineering and Dell Med being highly represented. Of the 77 applications that were selected for the Consulting Phase, >28% are composed of multi-college/school teams.

Twenty-six teams from the consulting phase have been awarded Phase Two seed funding awards – totaling \$800,000. **Almost 100% Catalyst applications selected for funding have Dell Med collaborations**<sup>24</sup>. As noted previously, these funds are allocated in \$5,000 to \$50,000 increments generally. From Phase Two awardees, 14 new startups have been created, 10 technologies have been licensed to established companies and nine products have entered clinical testing phases. The broader relevance and interest of these emerging technologies and companies is attested by the >\$49M in follow-on grant and equity financing received, an impressive impact in a four-year period.

Texas Health Catalyst has also engaged pressing issues beyond its direct programs. For example, in 2017, the team assisted in the recruitment of Merck & Co. to the Austin area where the firm established a digital innovation hub<sup>25</sup>. And as the COVID-19 pandemic began in 2020, Texas Health Catalyst lent its innovative practices to assist Central Texas' response by working as part of collaborative teams to design a low-cost emergency ventilator – philanthropic donors supported the development of a ventilator costing ~\$2K (compared with traditional \$25K) that was submitted to US-FDA for emergency use approval; and to produce an improved facial shield – *de novo* product designed and produced at a cost of \$1.50 shield; 45,000 shields delivered to Austin-area organizations.

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<sup>23</sup> Viswanathan and Gadgil. 2020. NEJM Catalyst Innovations in Care Delivery.  
<https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0518>

<sup>24</sup> Personal communication, Ruben Rathnasingham, January 14, 2022.

<sup>25</sup> <https://www.bizjournals.com/austin/news/2017/08/22/ut-regents-to-ink-first-real-estatedeal-with-merck.html>

### *Key Insights*

Team is critical. Texas Health Catalyst has built a committed team with medical, business, and programmatic skills. Further, it smartly leverages expertise from Dell Med, UT Austin colleagues and community collaborators to expand its capabilities. This approach has helped stimulate many collaborations between researchers at Dell Med and other UT Austin Schools and Colleges.

Early-stage action. The Texas Health Catalyst team has focused on the importance of identifying early-stage innovations and exposing these to experts while the innovators and product concepts are still malleable. More advanced concepts often ossify with the biases of the innovator, funders, or even early market success and fail to understand and pivot to broader, more impactful application.

Capacity-building pays off. The Texas Health Catalyst team and successful approach provided the basis and confidence to engage in new, riskier programs – including Painstorming and advanced product design and production through its response to COVID-19.

### *Community Opinion*

Beyond UT Austin faculty, who have demonstrated support for Texas Health Catalyst and elaborated on its value elsewhere,<sup>26</sup> the program has a broad network of about 350 advisors/mentors in Central Texas across many expertise areas. These advisors/mentors make the program an important interface between Dell Med with the Austin life science (bioscience) community. Virtually every one of the 12 interviews conducted for this report with members of the Austin bioscience community mentioned the importance of Texas Health Catalyst and its team. The program is perceived by those interviewed to be the front-door for Austin community collaboration with Dell Med. Omar Hakim, VP of Client Strategy at Michael Best & Friedrich LLP, described the impact of Texas Health Catalyst:

“You can help bring life-changing innovations and therapies from the lab to the patient; develop a local ecosystem that intersects technology and health and that supports and encourages early-stage innovators; and impact the well-being and livelihood of the community,<sup>27</sup>”

A leading Austin-based physician-entrepreneur noted that he has seen many programs attempt this type of bioscience acceleration, but these have not produced notable results. He felt Texas Health Catalyst is an effective program of this focus and type. A leading Austin-based IP attorney noted the program’s uniqueness within a medical school, and one that many schools would want to have. She further noted that the program sows the seeds for innovation by putting healthcare innovation front and center almost equal to patient care. A medical device entrepreneur from Central Texas who has engaged Texas Health Catalyst was surprised at how early-stage the program’s innovations are. And he noted that the program gets “the flywheel moving” – taking an idea to the point of company start. Finally, a serial entrepreneur who was part of a winning Demo Day team, noted that Texas Health Catalyst connected him with the I-

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<sup>26</sup> <https://dellmed.utexas.edu/blog/an-insiders-look-at-texas-health-catalyst> ; Viswanathan and Gadgil. 2020. NEJM Catalyst Innovations in Care Delivery. <https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0518>

<sup>27</sup> <https://dellmed.utexas.edu/blog/demo-day-2018>

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CORPS process which he found quite valuable.<sup>28</sup> After I-CORPS he joined the Texas Health Catalyst competition and obtained important advisors through the process. Even after the competition, the program team was the company's chief advocate locally providing important validation and contacts for a fledgling company.

From our interviews with 12 Austin community leaders, we found the claim from the NEJM Catalyst article to be true:

“The impact of Texas Health Catalyst extends well beyond Dell Med, into UT Austin and the Central Texas community, and has included the development of new products for better care and improved outcomes, novel interdisciplinary collaborations with expanded funding opportunities, academic-industry partnerships, and unique educational offerings.”<sup>29</sup>

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<sup>28</sup> I-Corps is the National Science Foundation's innovaton program that trains scientists and engineers in technology commercialization techniques, moving innovations from the lab to the marketplace. <https://beta.nsf.gov/funding/initiatives/i-corps/about-i-corps>.

<sup>29</sup> Viswanathan and Gadgil. 2020. NEJM Catalyst Innovations in Care Delivery. <https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0518>