

Strategic Planning for Success and Sustainability

How I built the plan, used it and revised it



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How I built and used NTU's strategic plans

A MODEL YOU CAN ADAPT TO YOUR TCU

- How we got here: early direction and successive five-year plans
- Where we are: results and the gaps that shape the next plan
- Where we are going: priorities with budgets and responsibility

1 HOW WE GOT HERE

2 WHERE WE ARE

3 WHERE WE ARE GOING

Navajo Philosophy of Education and Strategic Planning

DINÉ PRINCIPLES INFORM A CONTINUING PLANNING CYCLE

Nitsáhákees (Thinking)

East (*Ha'a'aah*)

Ground priorities in community needs and capacity.

Nahat'á (Planning)

South (*Shádi'ááh*)

Assign goals, resources and accountable leadership.

liná (Living / Implementation)

West (*E'e'aah*)

Carry out commitments that advance community goals.

Sihasin (Reflection)

North (*Náhookos*)

Use outcomes and reflection to renew the plan.



Cultural learning center under construction
Crownpoint Institute of Technology (now NTU)

Diné philosophy makes strategic planning a continuing responsibility to the community, with reflection shaping the next commitments.

2003–2005 Plan: Early strategic direction

A DEGREE GOAL SHAPED THE EARLY DIRECTION

- Scott joined in 2003 and built a computer-aided drafting program
- Resources: a single-wide trailer, butcher paper and one shared T-square
- The initial goal was an associate degree with stronger digital skills
- NTU invested in computers and software as the program developed



Crownpoint Institute of Technology (now NTU)

The degree goal linked curriculum development with institutional investment.

2006-ONGOING Plan: NASA internships shaped the plan

PREPARATION FOR WORK AT MARSHALL

- Goal: secure NASA funding to prepare students for NASA internships and technical careers
- Internships exposed students to 3D modeling, printing and laser scanning
- The next plan brought those skills into campus coursework and equipment

Internship needs shaped curriculum and equipment priorities in the next plan.

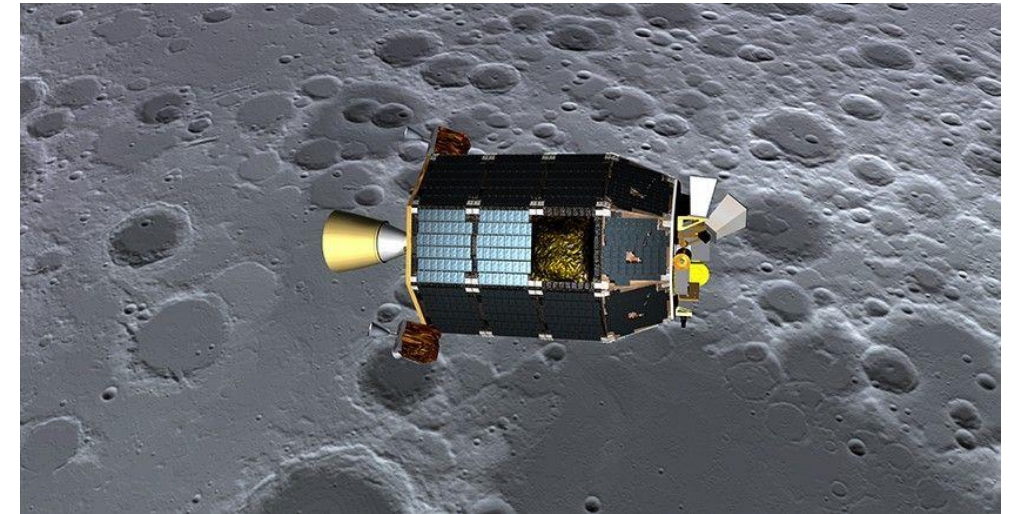


**Candice Craig and Oga John
Marshall Space Flight Center, 2011**

A student product NASA actually used

JARON EDSITTY AND THE LADEE MODEL

- Beginning in 2010, Jaron Edsitty and fellow interns created a detailed LADEE scale model
- NASA used the model for events and requested additional models after its success
- Edsitty later attended the LADEE launch at Wallops



NASA's use of student work provided external evidence for the plan's commitment to applied technical education.

2007–2012 Plan: Digital manufacturing and degrees

A BROADER DEGREE PATHWAY

- Goals: secure NSF funding to expand the Associates degree to a four-year IT degree with three tracks and a B.S. engineering pathway
- Needed: prototyping and precision measurement so students could build their designs and verify the accuracy of the finished parts
- Results: new degree pathways, laser scanning, portable CMM and robotics



The strategic plan used NASA's technical requirements to guide degree development, aligning academic goals with the capabilities graduates would need in professional practice.

Tooling U-SME supported the learning pathway

STRUCTURED COURSEWORK ALONGSIDE HANDS-ON WORK

- Tooling U-SME subscriptions supplied manufacturing coursework used at NTUCAM
- Topics included safety, CNC programming, metrology, materials and AM
- Course completion and credentials complemented supervised laboratory work



A strategic education plan needs evidence of both subject knowledge and the ability to apply it in demanding technical work.

2013–2017 plan: metal AM capacity

A LARGER GOAL REQUIRED A COMPLETE WORKFLOW

- Goals: secure funding from multiple sources to advance the Center's robust metal AM lab and begin a business arm
- Needed: a complete manufacturing workflow enterprise, including design and material preparation, metal printing, finishing, inspection and testing
- Results: metal AM, CT inspection, wire EDM and wider collaborations



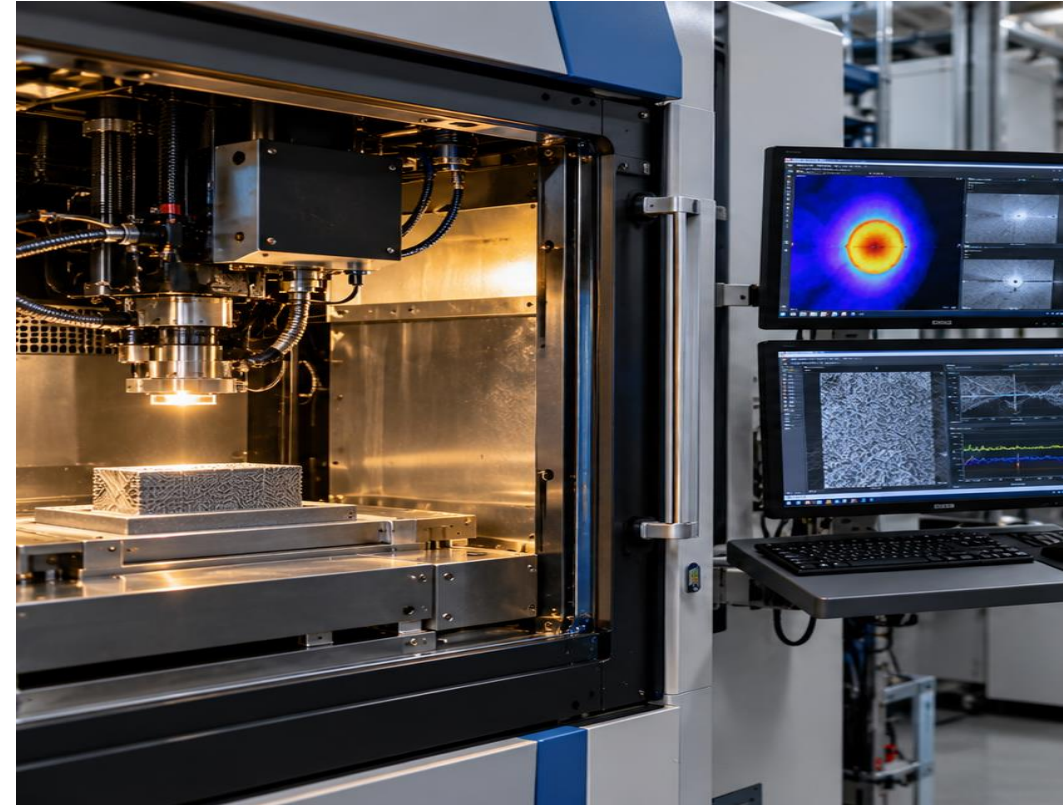
The metal AM plan coordinated investments across the full workflow, giving each acquisition a defined educational and research purpose.

2018–2022 plan: research partnerships and expertise

RESEARCH PARTNERSHIPS BUILT TECHNICAL CAPABILITY

- Goals: build research capability through university and technical collaborators
- Research partners and Sigma Labs helped NTUCAM personnel develop expertise with equipment, monitoring and research methods
- Results: stronger in-house capability, collaborative research and a growing publication record

Partnerships filled specific capability gaps and helped turn equipment investments into research capacity.



2018–2022: research led to publications

RESEARCH COLLABORATION PRODUCED PUBLISHABLE RESULTS

- Process–Structure Relationship in Directed Energy Deposition of Cobalt–Chromium Alloy Coatings (2020)
- Thermal Modeling in Metal Additive Manufacturing Using Graph Theory (2021)
- Digitally Twinned Additive Manufacturing: Detecting Flaws in Laser Powder Bed Fusion (2021)
- Deep Learning for In-Situ Layer Quality Monitoring During Laser-Based DED (2022)
- Ultrasonic Testing of Metallic Alloy Specimens with Application to Additive Manufacturing (2022)



At least ten publications/proceedings provided visible evidence of NTUCAM's growing research capability.

Foundational NSF investment in 2018

NSF'S \$3.5 MILLION FOUNDATIONAL AWARD

- NTU received \$3.5 million to establish the Center for Advanced Manufacturing from NSF
- The Center joined student learning with laboratory research and technical services
- New Certificate and degree pathways informed the plan

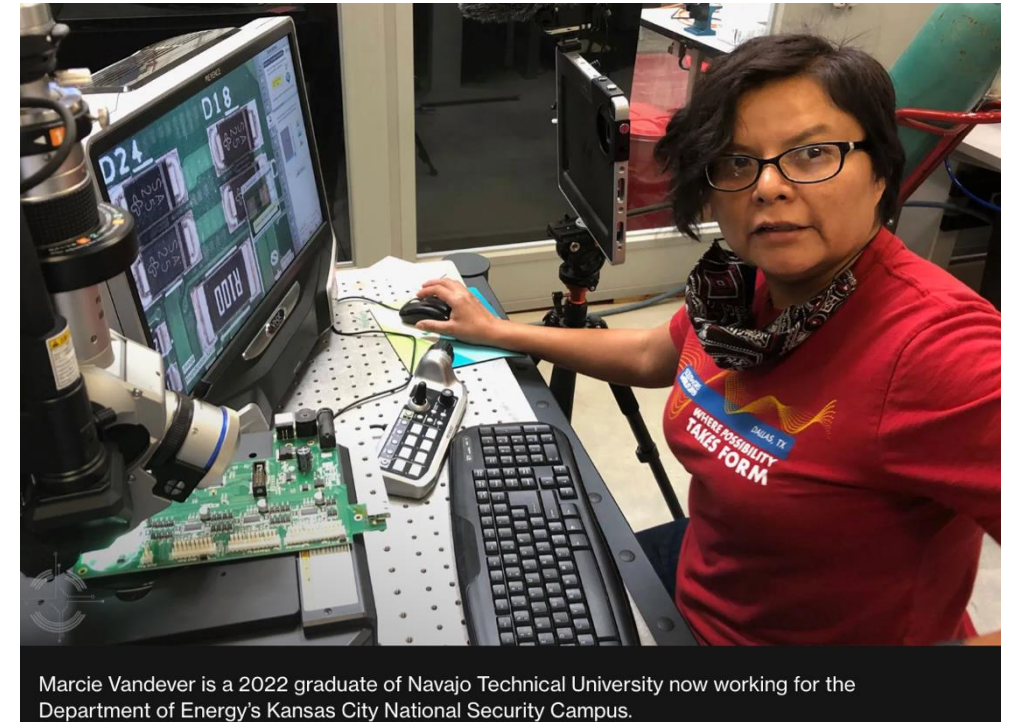


The 2018 investment supported a center whose educational and research roles required an enduring operating commitment.

2022: Students carried out the full workflow

MARCIE VANDEVER'S MANUFACTURING RESEARCH

- Marcie investigated stainless-steel parts made by directed energy deposition
- Her work included CAD, printing, machining, CT inspection and materials testing
- NTU graduates on the laboratory staff helped support her research



Marcie Vandever is a 2022 graduate of Navajo Technical University now working for the Department of Energy's Kansas City National Security Campus.

Student research tested whether the plan's separate equipment investments worked together as a complete manufacturing capability.

2023-2027: Priorities adapted to new needs

RESEARCH CAPABILITY AND COMMUNITY ENTERPRISE

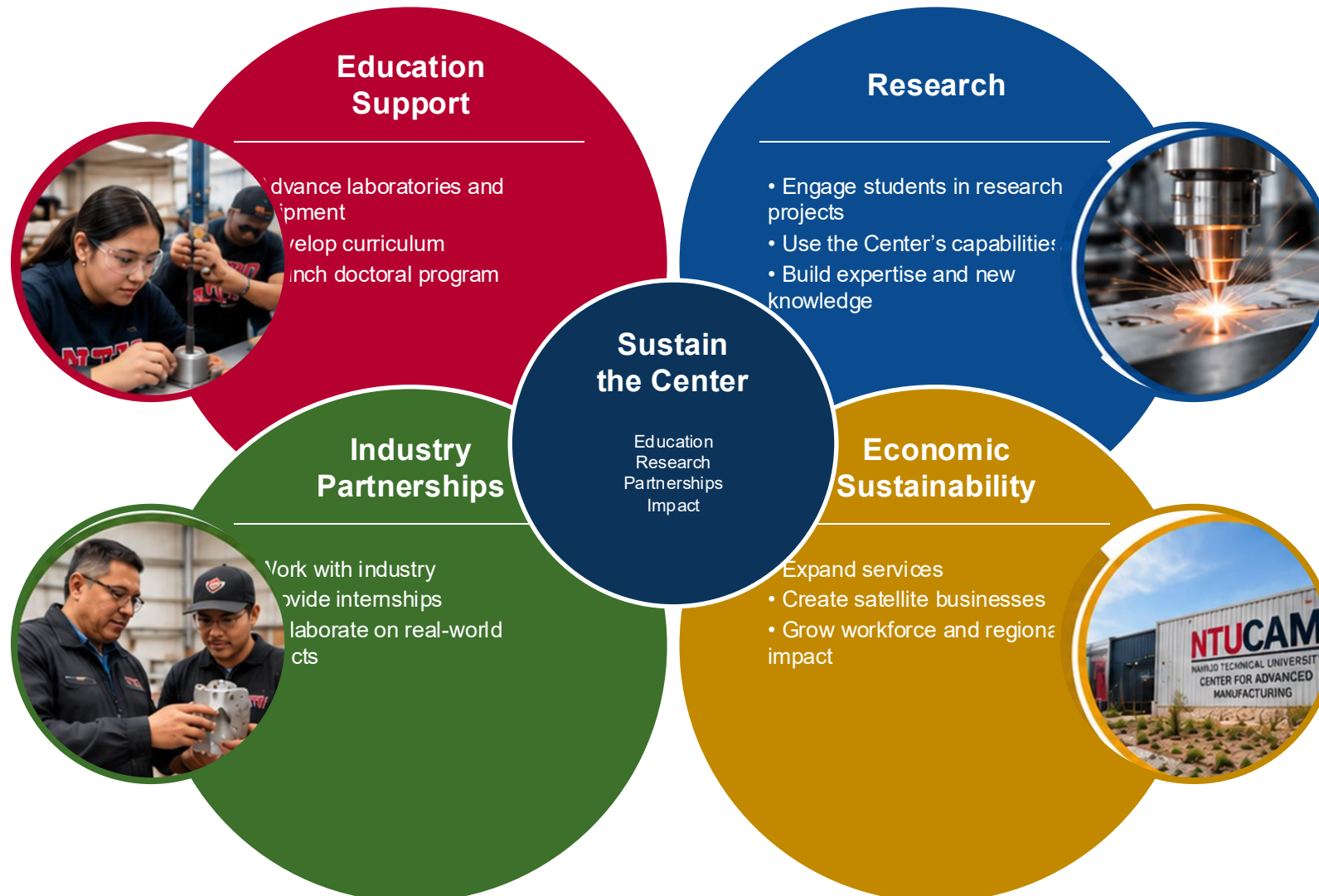
- 2023: NSF Engines development award addressed manufacturing micro-factories in tribal communities
- 2023: A TEA Center renewal is requested to continue advanced manufacturing development
- The strategy increasingly connected campus capability with opportunities on tribal lands



The 2023–2027 plan extended manufacturing capability toward workforce development and enterprise in tribal communities.

The Plan Organized Four Connected Priorities

EXAMPLE FROM THE 2023–2027 PLAN



The plan connected educational and research priorities with partnership commitments and the means to sustain the Center.

2024: Ridgeline partnership

2024: RIDGELINE ADDED A LOCAL PRIVATE-INDUSTRY PARTNER

- NTUCAM began partnering with Ridgeline Manufacturing in 2024.
- The partnership added a like-minded New Mexico private-industry collaborator.
- Ridgeline connected research and equipment capability with applied manufacturing, workforce and enterprise opportunities.

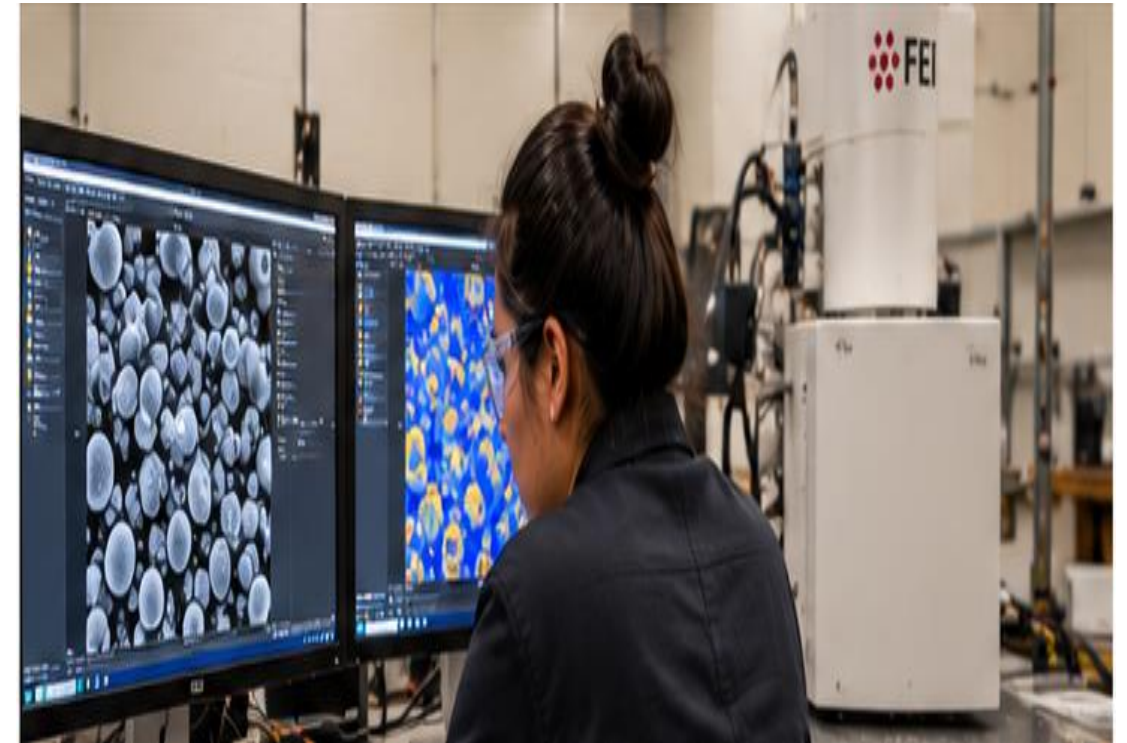


Ridgeline belongs in the 2024 story—not in the 2018–2022 research-partnership timeline.

2025–2026 Awards: NTUCAM

MULTI-YEAR AWARDS CONTINUED TO BUILD THE CENTER

- 2026 — NSF TCUP Award 2627955: \$100K new NTU TCUP award; confirm the project scope before identifying it specifically as an NTUCAM award.
- 2024–2029 — NSF TCUP TEA Center Renewal: \$3.5M supporting advanced-manufacturing education, credentials, faculty development and research.
- 2023–2026 — NSF Engines Development Award: $\approx$ \$1.0M advancing distributed manufacturing and micro-factory concepts for Tribal and rural communities.



2025–2026 Awards: NTUCAM

NEW FUNDING EXPANDED MANUFACTURING AND WORKFORCE CAPACITY

- 2026 — SBA Manufacturing in America / Empower to Grow: ≈ \$4.5M for manufacturing workforce training and coordinated curricula across NTU and satellite sites.
- The award moves NTUCAM beyond individual equipment investments toward multi-site workforce delivery and technical assistance.



Planning Lesson: Scale funding to the next stage of the strategic plan—not simply to the next piece of equipment.

A goal became an implementation row

HISTORICAL PLAN EXCERPT: A METROLOGY PROGRAM

Action	Leadership	Budget	Funding	Unmet need	Progress
Create Metrology Program	Scott, TBD	\$150,000	Possible Perkins funding	\$150,000	Equipment in place; instructor needed; draft curriculum needed

The implementation table exposed a dependency: the metrology program needed instructional leadership and curriculum as well as equipment.

An operating budget was a planning task

HISTORICAL PLAN EXCERPT: RESEARCH METROLOGY

Action	Leadership	Annual need	Secured	Unmet need	Progress
Establish NTU Budget	Scott, NTUCAM staff	\$5,000	\$0	\$5,000/year	None

The plan treated recurring research costs as an explicit funding obligation alongside capital investment.

Original plan page: research budget

goals of Navajo Nation (plant or small manufacturing design, material properties skills and knowledge, metrology skills and knowledge, pathway to research with academia)	Committee, Navajo Nation				developed – AAS Engineering Technology pre-requisite Programs include: AM technician, metrology technician, materials lab technician
Adjust curriculum content to reach the goals of NTU	Scott				

Priority 2: Research

~~To develop a comprehensive research agenda which arises from the projects and focus of the Center. Research will leverage and build upon the Center's equipment and materials and previous research.~~

Goals and Objectives: To develop a comprehensive research agenda which arises from the projects and focus of the Center. Research will leverage and build upon the Center's equipment and materials and previous research.

	Leadership	Budget	Secured Funding	Unmet Need	Progress
Research Support - Metrology					
Establish Metrology Lab to support research activities	Scott	\$2.5 million	EDA & NN \$2.5 million	\$0-00	Building A/E services and TEA funding for equipment
Equipment for lab	Scott	\$300,000	Portion of \$3.5 million TEA	\$275,000	Most equipment already acquired – need granite tables
Establish NTU Budget	Scott, Casmir, Geraldine	\$5,000/year	\$0-0	\$5,000/year	None
Attain Lab	Scott	~\$20,000/year	\$0-0	\$20,0000	Filing of

Original plan: education implementation

APPENDIX A

IMPLEMENTATION for NTU-CAM

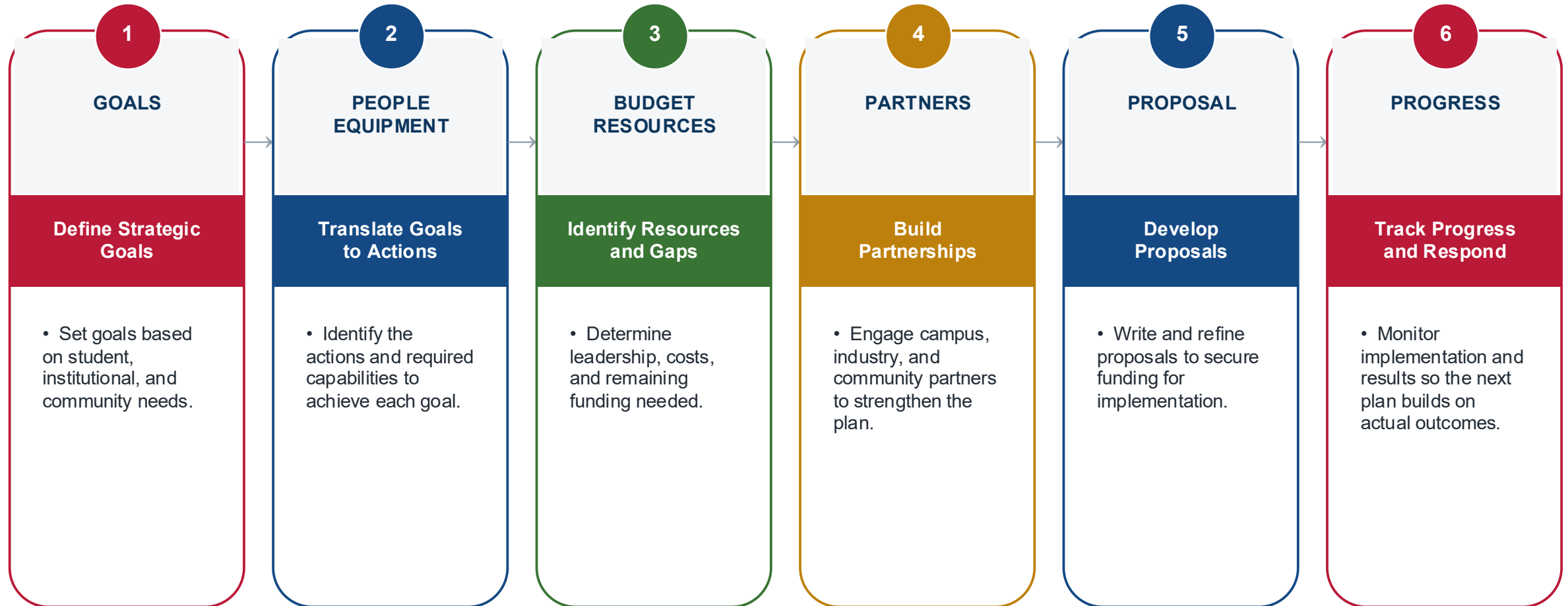
Priority 1: Education Support

Goals and Objectives – Equip Provide the Center with equipment relevant to advanced manufacturing-based curriculum

	Leadership	Budget	Secured Funding	Unmet Need	Progress
Support Metrology Education					
Establish Educational Lab	Scott	\$2.5 million	EDA & NN \$2.5 million	\$0.00	Design phase almost complete (8-30-2020)
Equipment for lab	Scott	\$300,000	Portion of \$3.5 million TEA	\$275,000	Equipment purchased and installed – need granite tables
Establish NTU Budget	Scott, Cheryl/Budget committee	\$5,000/year	\$135,000/year	\$0/year	CDT Budget now implemented
Create Metrology Program	Scott, TBD	\$150,000	Possible Perkins Funding	\$150,000	Equipment in place, need instructor. Curriculum developed (draft)
Support Material Science Education					
Establish Lab	Scott	\$5,000	Portion of \$3.5 million TEA	\$0.00	New Building being designed
Establish NTU Budget	Scott, Cheryl/Budget committee	See budget above	\$0.00	\$0	Budget is implemented
Support Machining Education					

How I Created the Written Plan

THE DECISIONS BEHIND THE DOCUMENTS



Funding opportunities are a fit test

A CLEAR CONNECTION BETWEEN MISSION AND OPPORTUNITY

- An agency may emphasize workforce, research capacity, resilience or advanced technology
- Use its current terms when they accurately describe the proposed work
- Explain your community's purpose through the relevant funding objective



A funding opportunity serves the plan when its scope and continuing obligations fit institutional priorities and operating capacity.

Where we are 2027-2031 plan: reflect on results and identify remaining gaps

AN ASSESSMENT BEFORE THE NEXT PLAN

- What can our people and equipment reliably do now?
- Where do students and partners still need support?
- What operating costs or staffing gaps could stop progress?



The next plan reconciles demonstrated results with the staffing and recurring costs required to sustain or expand them.

Student pathways as a planning measure

TECHNICIAN → SCIENTIST → ENGINEER → RESEARCHER → ENTREPRENEUR

- I began with technician skills — built confidence through hands-on equipment operation, safety, fabrication, and industry-recognized competencies.
- Developed scientific understanding — connect hands-on work to materials, processes, measurement, and evidence.
- Advanced toward engineering — apply technical and scientific knowledge to design, problem-solving, and manufacturing challenges.



Build pathways that allow TCU students to advance from technical skills to increasingly complex roles in science, engineering, research, and entrepreneurship.

Nahat'á and liná: Commitments Become Action

DINÉ PHILOSOPHY IN THE IMPLEMENTATION PLAN

- Nitsáhákees: define the metrology program's benefit to students and the community
- Nahat'á: specify program leadership, curriculum, costs and sources of support
- liná: align equipment with instructors and courses that deliver the program
- Sihasin: review what is ready and what still prevents implementation



Diné philosophy connects the purpose of a goal with the commitments and evidence required to carry it forward.

Where we are going: the next planning decisions

PRIORITIES FOR THE 2026–2031 PLAN

- More shared research with other TCUs
- Stronger industry and national laboratory engagement
- Manufacturing enterprises on and around Navajo Nation
- Staffing and operating support to sustain these priorities



Sihasin: Reflection Shapes the Next Plan

ASSURANCE THROUGH EVIDENCE AND COMMUNITY PURPOSE

- Which results demonstrate that the plan served students and community priorities?
- Where did staffing, funding or partnerships limit implementation?
- What should the institution sustain, revise or discontinue?
- What new understanding should guide the next Nitsáhákees and Nahat'á?



Reflection tests the relationship between intention and actual outcomes, then renews strategic commitments in light of community priorities.

Discussion and Q&A

How could this model help YOU move a priority at YOUR TCU from idea to measurable outcome?



A planning example for YOUR TCU

THE QUESTIONS EACH INSTITUTION CAN ANSWER

- What goal matters to your students and community?
- What work and resources does that goal require?
- Who will take responsibility, and what remains unfunded?
- What evidence will tell you whether to continue or revise?

Each strategic objective needs accountable leadership, a credible resource commitment and evidence that can guide its revision.