

USU Technology Transfer Services

Market Research & Commercialization Guide

Draft Handbook for Faculty, Staff, Postdoctoral Researchers, and Graduate Students

Introduction

Commercialization transforms research discoveries into products and services that create societal and economic impact. Funding agencies increasingly expect investigators to demonstrate not only scientific merit but also a credible commercialization strategy. This guide introduces practical methods for understanding markets, validating customer needs, evaluating competition, estimating market opportunity, and developing commercialization plans that strengthen grant proposals and licensing opportunities.

The guide is intended for researchers at Utah State University who are preparing disclosing inventions, exploring licensing opportunities, or considering startup formation. Each chapter provides explanations, best practices, and practical recommendations that can be adapted to technologies across engineering, agriculture, biotechnology, software, aerospace, energy, and the physical sciences.

Table of Contents

Section	Pages
Introduction & Commercialization Roadmap	1
1. Defining the Market Need	2
2. Competitive Landscape	2
3. Industry Analysis	2
4. Commercialization Strategy	2
Resources	2



Commercialization Roadmap

Commercialization is an iterative process rather than a single event. Successful innovations typically move through invention disclosure, intellectual property protection, customer discovery, market validation, prototype development, funding, licensing or startup formation, and finally market launch. Understanding where your project fits within this roadmap helps prioritize activities and identify knowledge gaps.

Researchers should revisit commercialization assumptions throughout development because markets, customer priorities, and competitive landscapes evolve.

Chapter 1. Defining the Market Need

Why Market Need Matters

Scientific discovery and technological innovation are the foundation of university research, but novelty alone rarely leads to successful commercialization unless a genuine market need exists and your technology provides a meaningful advantage over current alternatives.

Funding agencies, investors, industry partners, and potential licensees increasingly expect researchers to articulate not only *what* their technology does, but *why it matters*. Proposals that clearly define the problem, identify the customers affected, and explain the value created by the innovation are significantly more compelling than those focused solely on technical performance.

Whether you are developing a new medical device, agricultural technology, software platform, advanced material, or engineering process, your commercialization strategy should begin with one central question:

Who has this problem, and why would they choose your solution over what already exists?

A well-defined market need demonstrates that your innovation solves an important problem, serves an identifiable customer base, and has a realistic opportunity for commercial adoption.

Technology Push vs. Market Pull

Many university inventions originate from a **technology push** approach, where researchers develop an exciting scientific breakthrough before identifying a commercial application. While this approach may produce remarkable discoveries, the discoveries will languish in obscurity without **market pull**, where customer needs guide technology development and product refinement.

Understanding this distinction helps researchers better position their work for commercialization.

Technology Push	Market Pull
Begins with a scientific discovery.	Begins with a clearly defined customer problem.
Focuses on technical novelty.	Focuses on customer value.
May identify applications after development.	Designs solutions around existing needs.
Higher commercialization uncertainty.	Greater likelihood of adoption.

The strongest commercialization strategies combine both approaches by leveraging scientific innovation to solve validated market problems.

Identifying the Problem

Before evaluating market size or commercialization pathways, clearly define the problem your technology addresses.

A compelling problem statement should explain:

- What challenge currently exists?
- Who experiences this challenge?
- Why is the problem important?
- What are the financial, operational, environmental, or societal consequences?
- How are customers currently addressing the problem?

Avoid vague statements such as:

"Current technologies are inefficient."

Instead, provide measurable evidence whenever possible.

Example

Current nitrate monitoring methods require laboratory analysis that delays decision-making by several days. Municipal water utilities often incur increased operating costs while waiting for results, creating demand for rapid, field-deployable sensing technologies.

Whenever available, support problem statements using published literature, government reports, industry publications, or market research.

Identifying Market Gaps

Market need often exists because current solutions fail to adequately address customer requirements.

Examples of market gaps include:

- High manufacturing costs
- Poor performance
- Slow processing times
- Limited accessibility
- Complex operation
- Regulatory limitations
- Environmental concerns
- Lack of scalability
- Poor durability
- Limited availability

Explain specifically how your technology addresses one or more of these gaps.

Example:

Existing water purification membranes effectively remove contaminants but require frequent replacement due to fouling. The proposed membrane coating extends operational lifetime [20%] by reducing biofilm formation, decreasing maintenance costs and downtime.



Defining Your Value Proposition

After identifying the market gap, describe the value your technology provides.

A strong value proposition answers three questions:

1. **Who is the customer?**
2. **What problem does the technology solve?**
3. **Why is the solution better than alternatives?**

Your value proposition should emphasize measurable benefits rather than technical specifications alone.

Examples include:

- Reduced manufacturing costs
- Faster diagnostics
- Improved patient outcomes
- Lower energy consumption
- Increased productivity
- Reduced waste
- Improved reliability
- Enhanced safety
- Simplified workflows

Whenever possible, quantify these improvements using experimental results or published benchmarks.

Common Mistake

Many researchers focus exclusively on explaining **how** their technology works instead of **why customers need it**. Technical novelty is important, but impact requires the innovation addresses a meaningful, validated problem and offers a compelling advantage over existing solutions.

Chapter 2. Competitive Landscape

A common misconception among researchers is that having no competitors means there is no competition. In reality, **every innovation competes against something**. Existing commercial products, alternative technologies, manual processes, academic research, or even the decision to do nothing all represent competition.

Researchers should conduct a thorough review of existing technologies while focusing on the products most relevant to their innovation. By evaluating both the strengths and limitations of competing solutions, you demonstrate a balanced understanding of the competitive landscape and clearly explain how your technology fits within—and improves upon—the current market.

Identifying Your Competition

Competition extends beyond products currently available for purchase. Researchers should evaluate multiple sources of competition to fully understand the market environment.

These include:

- **Commercial Products**
- **Academic Research**
- **Patent Literature**
- **Substitute Technologies**

Developing a Competitive Matrix

A competitive matrix is an effective way to summarize how your technology compares with existing solutions.

Example Competitive Analysis

Feature	Competitor A	Competitor B	Your Technology
Detection Time	45 min	30 min	5 min
Manufacturing Cost	High	Medium	Low
Field Deployable	No	Limited	Yes
Regulatory Status	Approved	Approved	In Development
Environmental Impact	Moderate	High	Low

This format quickly communicates competitive advantages while acknowledging areas where competing products may still perform well.

Identifying Your Competitive Advantage

Competitive advantage should be defined in terms of **customer value**, not simply technical novelty.

Whenever possible, quantify these improvements.

For example:

"The proposed catalyst reduces reaction time by 65% while decreasing manufacturing costs by approximately 30%."

Quantitative comparisons are significantly more persuasive than qualitative statements.

Competition Is Continually Changing

The competitive landscape is not static. New companies emerge, patents expire, regulations evolve, and customer priorities shift over time.

Researchers should periodically revisit their competitive analysis throughout the commercialization process to ensure it reflects current market conditions.

Regular updates are particularly important before:

- Grant submissions
- Licensing discussions

- Investor presentations
- Startup formation
- Product launch

Maintaining an up-to-date understanding of the market helps ensure commercialization decisions remain grounded in current evidence.

Best Practice

Support competitive claims with objective evidence from market reports, scientific publications, patent searches, customer interviews, and publicly available company information. An honest, data-driven assessment of competitors builds far more credibility than claiming there is "no competition."

Common Mistake

Many researchers assume that because their technology is scientifically novel, it has no competitors. In reality, customers compare every new solution against existing products, established workflows, substitute technologies, and the cost of making no change at all. A successful commercialization strategy demonstrates not only technical innovation but also a clear understanding of why customers would choose your technology over available alternatives.

Chapter 3. Industry Analysis

Why Industry Analysis Matters

A promising technology can still face significant commercialization challenges if it enters an unfavorable market. Industry analysis helps researchers understand the external factors that influence product adoption, market growth, competition, and long-term commercial success. While market size estimates quantify the commercial opportunity, industry analysis provides the context needed to determine whether that opportunity is achievable.

Industry analysis builds upon other resources we've discussed to provide a more complete understanding of the environment in which a technology will compete.

Understanding the Commercial Environment

Every technology exists within a broader commercial ecosystem. Researchers should understand not only their target customers, but also the market forces that influence purchasing decisions and technology adoption.

Examples include:

- Regulatory requirements
- Supply chain availability
- Manufacturing capacity
- Customer demand
- Industry growth
- Investment activity
- Economic conditions
- Technological advancements
- Environmental and sustainability initiatives

These factors can create opportunities or barriers that significantly affect commercialization success.

Evaluating Industry Trends

One of the first steps in industry analysis is understanding how the market is changing.

Questions to consider include:

- Is the industry growing or shrinking?
- What is the projected compound annual growth rate (CAGR)?
- What technologies are emerging?
- Are customer preferences changing?
- Are regulations becoming more favorable or restrictive?
- What investments are occurring in this sector?

For example, rapid growth in precision agriculture, renewable energy, and artificial intelligence has created new commercialization opportunities for university-developed technologies. Conversely, declining industries may present greater commercialization challenges despite technical innovation.

Useful sources for identifying industry trends include:

- Industry market reports
- Trade associations
- Government reports
- Scientific literature
- Investment databases
- Industry conferences

Regulatory Considerations

Many technologies must satisfy regulatory requirements before entering the marketplace. Understanding these requirements early can reduce commercialization risk and improve development timelines.

Regulatory considerations vary by industry.

Examples include:

Industry	Regulatory Examples
Medical Devices	FDA clearance or approval
Pharmaceuticals	FDA, EMA, clinical trials
Agriculture	USDA, EPA
Food Technologies	FDA, USDA
Environmental Technologies	EPA, state agencies
Aerospace	FAA, NASA standards

Researchers should ask:

- What approvals are required?
- How long does the approval process typically take?
- What data will regulators require?
- Will regulatory approval influence manufacturing or pricing?

Understanding these requirements early allows commercialization plans to incorporate realistic timelines and development costs.

Manufacturing and Supply Chains

Commercial success depends not only on whether a product works, but also on whether it can be manufactured consistently, economically, and at scale.

Questions to evaluate include:

- Are raw materials readily available?
- Are specialized manufacturing processes required?
- Are there supply chain vulnerabilities?
- Can production scale to meet demand?
- Are contract manufacturers available?
- What quality standards must be maintained?

For example, technologies relying on scarce materials or specialized manufacturing equipment may face additional commercialization challenges compared with products that can leverage existing manufacturing infrastructure.

Reimbursement and Market Access

For healthcare technologies, reimbursement often has a greater influence on commercialization success than technical performance.

Questions include:

- Will insurance providers reimburse the technology?
- Are reimbursement codes already available?
- Who ultimately pays for the product?
- Does the technology reduce healthcare costs?

Similarly, in other industries, researchers should evaluate procurement practices, purchasing contracts, and distribution systems that influence customer access.

Investment Landscape

Commercialization is also influenced by the availability of investment and strategic partnerships.

Researchers should investigate:

- Venture capital activity
- Corporate investments

- Government funding
- Startup formation
- Industry acquisitions
- Licensing activity

Strong investment activity often indicates increasing commercial interest within an industry.

Resources such as PitchBook, Crunchbase, and industry news can provide valuable insight into funding trends and emerging companies.

Identifying Commercial Risks

Industry analysis should conclude by identifying the primary risks that could affect commercialization.

Examples include:

- Regulatory delays
- Manufacturing costs
- Supply shortages
- Competitive technologies
- Customer adoption
- Economic downturns
- Intellectual property challenges

Recognizing these risks early allows researchers to develop mitigation strategies and demonstrate thoughtful commercialization planning.

Best Practice

Use multiple analytical frameworks rather than relying on a single method. Combining industry reports, customer discovery, SWOT analysis, PESTLE analysis, and Porter's Five Forces provides a more comprehensive understanding of the commercial environment. Support your conclusions with objective evidence from market reports, government publications, and industry data rather than relying on anecdotal observations.

Common Mistake

Researchers often focus exclusively on the technical performance of their innovation while overlooking the external factors that determine commercial success. A superior technology may still struggle if it enters a declining market, faces significant regulatory barriers, or depends on an unstable supply chain. Industry analysis should evaluate the entire commercialization ecosystem—not just the invention itself.



Chapter 4. Commercialization Strategy

Why a Commercialization Strategy Matters

A successful commercialization strategy provides a clear roadmap for transforming an innovative research discovery into real-world impact. While strong science is the foundation of commercialization, even groundbreaking technologies require thoughtful planning to reach the marketplace.

Funding agencies, investors, industry partners, and potential licensees increasingly expect researchers to demonstrate that they have considered not only *what* they have invented, but also *how* that invention will be developed, manufactured, distributed, regulated, and adopted by customers.

A commercialization strategy should answer questions such as:

- How will this technology reach the marketplace?
- Who will develop the final product?
- What partnerships are needed?
- What technical and commercial milestones remain?
- What resources are required?
- What risks could delay commercialization?

Rather than presenting commercialization as a single event, researchers should view it as a series of coordinated activities that reduce technical, regulatory, manufacturing, and market risk over time.

Choosing the Right Commercialization Pathway

There is no single commercialization pathway that fits every technology. The appropriate strategy depends on factors such as market maturity, intellectual property, capital requirements, manufacturing complexity, regulatory requirements, and the research team's long-term goals.

The most common pathways include:

Licensing to an Existing Company

Many university technologies are commercialized through licensing agreements with established companies.

This approach is often appropriate when:

- Existing companies already serve the target market.
- Manufacturing infrastructure already exists.
- Regulatory expertise is required.
- Large-scale distribution networks are necessary.
- Significant capital investment would otherwise be required.

Licensing allows companies to leverage university-developed intellectual property while researchers continue focusing on innovation and research.

Startup Formation

Some technologies create entirely new market opportunities or require significant product development before becoming attractive to existing companies.

Launching a startup may be appropriate when:

- The technology represents a disruptive innovation.
- No existing company is well positioned to commercialize it.
- The founders wish to remain actively involved.
- Venture capital or SBIR/STTR funding opportunities exist.
- The technology requires further development that cannot easily be done at a research institution.

While startups offer greater control over commercialization, they also require additional expertise in business development, fundraising, hiring, regulatory planning, and operations.

Sponsored Research Partnerships

Industry-sponsored research can provide funding while allowing companies to evaluate technologies before licensing.

These partnerships often:

- Validate technology performance
- Build industry relationships
- Generate additional research funding
- Identify future licensing opportunities
- Reduce commercialization risk

Sponsored research is particularly valuable for early-stage technologies requiring additional technical validation.

Joint Development Agreements

Joint development agreements involve collaborative product development between the university and an industry partner.

These agreements may include:

- Shared research activities
- Prototype development
- Manufacturing optimization
- Regulatory planning
- Product testing

Joint development can accelerate commercialization by combining academic innovation with industry expertise.

Building a Commercialization Roadmap

A commercialization strategy should outline the major milestones required to bring a technology to market. While every technology follows a unique path, most commercialization efforts progress through similar stages.

Example Commercialization Roadmap

Stage	Objective
Research Discovery	Develop and validate the scientific concept
Invention Disclosure	Protect intellectual property through USU Technology Transfer Services
Proof of Concept	Demonstrate technical feasibility
Prototype Development	Build and test an initial prototype
Customer Discovery	Validate customer needs and applications
Market Validation	Confirm commercial opportunity
Intellectual Property Protection	File patent applications or other IP protections
Funding	Secure grants, investment, or industry support
Product Development	Refine the technology for commercial use
Regulatory Approval (if applicable)	Obtain required certifications or approvals
Manufacturing Scale-Up	Establish production capabilities
Market Launch	Introduce the product to customers
Market Expansion	Enter additional customer segments and geographic markets

Not every technology will follow every step, but a clearly defined roadmap demonstrates thoughtful commercialization planning.

Manufacturing Strategy

One of the most overlooked components of commercialization is manufacturing.

A technology that performs exceptionally well in the laboratory may still face commercialization challenges if it cannot be manufactured reliably, economically, or at scale.

Researchers should consider:

- Can existing manufacturing methods be used?
- Will specialized equipment be required?
- Are raw materials readily available?
- Can production be scaled efficiently?
- Will manufacturing require outside partners?

For many university technologies, manufacturing will eventually transition to an industry partner rather than remaining within the research laboratory.

Strategic Partnerships

Successful commercialization rarely occurs in isolation.

Researchers should identify the organizations that can accelerate commercialization.

Potential partners include:

- Manufacturing companies
- Distributors
- Strategic corporate partners
- Government laboratories
- National laboratories
- Contract research organizations (CROs)
- Contract manufacturing organizations (CMOs)
- Clinical partners
- Agricultural cooperatives
- Industry associations

Commercialization strategies should identify scaling partnerships, leverage existing relationships, and explain how these collaborations support product development and distribution. These partnerships often provide expertise, facilities, credibility, and market access that universities alone cannot offer.

Regulatory Strategy

Many technologies require regulatory approval before commercialization.

Researchers should identify:

- Applicable regulatory agencies
- Required testing
- Expected approval timelines
- Estimated regulatory costs
- Data requirements

Examples include:

Technology	Regulatory Considerations
Medical Device	FDA 510(k) or PMA
Therapeutic	FDA clinical trials
Agricultural Product	EPA and USDA approvals
Food Technology	FDA and USDA regulations
Aerospace Technology	FAA certification



Technology	Regulatory Considerations
Environmental Technology	EPA standards

Including regulatory milestones strengthens commercialization plans and demonstrates realistic expectations.

Funding Strategy

Commercialization often requires multiple sources of funding throughout development.

Potential funding sources include:

Non-Dilutive Funding

- NSF SBIR/STTR
- NIH SBIR/STTR
- USDA SBIR
- DOE SBIR
- ARPA-E
- NASA
- DOD

Investment

- Angel investors
- Venture capital
- Strategic corporate investment
- Family offices

University Resources

- Proof-of-concept funding
- Commercialization grants
- Technology maturation funds
- Translational research programs

Researchers should explain which funding opportunities align with their commercialization timeline.

Developing Milestones

Commercialization milestones should be measurable and achievable.

Examples include:

Technical Milestones

- Complete prototype

- Improve performance
- Demonstrate durability

Commercial Milestones

- Conduct 50 customer interviews
- Identify pilot partners
- Execute license option agreement

Regulatory Milestones

- Complete preclinical testing
- Submit FDA application

Manufacturing Milestones

- Establish manufacturing process
- Produce pilot-scale batches

Clear milestones allow researchers to track progress and communicate development plans to stakeholders.

Example Commercialization Timeline

The following example illustrates how commercialization activities may progress over several years.

Year	Milestone
Year 1	Invention disclosure, patent filing, proof of concept
Year 2	Customer discovery, prototype development, market validation
Year 3	Sponsored research, pilot testing, regulatory planning
Year 4	Manufacturing scale-up, licensing discussions or startup formation
Year 5	Product launch and market expansion

Actual timelines vary depending on technology complexity, regulatory requirements, and available funding.

Commercialization Is an Iterative Process

Commercialization plans should not be viewed as static documents.

Customer needs, competitive landscapes, funding opportunities, and regulatory environments evolve over time.

Researchers should regularly revisit their commercialization strategy to:

- Update milestones
- Refine customer segments
- Identify new partnerships



- Incorporate customer feedback
- Respond to competitive changes

Flexibility is often one of the strongest indicators of a successful commercialization effort.

Best Practice

Develop a commercialization strategy that aligns with the maturity of your technology rather than attempting to describe every possible future opportunity. Clearly explain why the selected pathway—whether licensing, startup formation, sponsored research, or joint development—is appropriate based on customer discovery, market analysis, available resources, and technical readiness. Support major decisions with market data, customer interviews, industry trends, and comparable commercialization examples whenever possible.

Common Mistake

A common mistake is assuming that commercialization begins only after research is complete. In reality, commercialization planning should begin early and evolve alongside the research itself. Another frequent error is presenting commercialization as a single event—such as forming a startup or licensing a patent—rather than as a series of technical, regulatory, manufacturing, and commercial milestones. A strong commercialization strategy demonstrates not only where the technology is today, but also the realistic path required to reach the marketplace.

Resources

Market Reports

Provide information on industry size, growth rates, customer trends, and major competitors.

Examples include:

- IBISWorld
- PitchBook
- MarketsandMarkets
- Frost & Sullivan
- BCC Research

Research Publications

Scientific literature helps identify competing technologies, technical limitations, and emerging research directions.

Useful databases include:

- Web of Science
- Scopus
- PubMed
- Google Scholar



Patent Databases

Patent searches identify existing intellectual property and reveal industry activity.

Recommended resources include:

- Google Patents
- USPTO
- Espacenet
- WIPO PATENTSCOPE

Customer Discovery

Customer interviews frequently provide the strongest evidence of market need by validating assumptions directly with end users, purchasing managers, clinicians, manufacturers, producers, or industry partners.

Working with USU Technology Transfer Services

Utah State University Technology Transfer Services assists researchers through invention disclosures, patent strategy, market research, customer discovery, licensing, startup support, and industry engagement. Early interaction with TTS often improves commercialization planning and increases competitiveness for translational funding opportunities.

Conclusion

Commercialization planning should begin alongside research rather than after scientific discovery. A thoughtful commercialization strategy demonstrates that an innovation addresses a real-world problem and has a credible pathway toward adoption. By integrating customer discovery, market analysis, competitive intelligence, and commercialization planning into the research process, investigators can strengthen grant proposals, improve licensing opportunities, and maximize the societal impact of their discoveries.