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Lessons Learned:

The Commercialization Process

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LESSONS LEARNED: THE COMMERCIALIZATION PROCESS

Prepared by

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ABSTRACT

One successful component of a commercialization strategy includes the implementation of an industrial outreach workshop. This workshop is designed to select an industrial partner with the skills necessary to successfully commercialize a federally-funded, laboratory-developed technology. These workshops provide efficiency and effectiveness and, in addition, ensure that all prospective partners receive equal access to the same quality and quantity of information.

Los Alamos National Laboratory has successfully applied this paradigm to several projects, including the large-volume flow-through detector system, headed by Russ Gritz, and polymer filtration, led by Barbara Smith. These two principal investigators work for the Chemical Science and Technology Division at Los Alamos.

Executive Summary

Successfully establishing a commercialization partnership involves a number of complex issues, factors, and relationships. The crucial components of such an effort are as follows:

- The dynamics of a multidisciplinary team created to achieve a common goal.
- The level of effort and commitment required of the team and its management.
- An outline of project goals, assignments, and team member responsibilities, including required tasks, necessary resources, and appropriate time frames to successfully commercialize a technology.

To establish a successful partnership requires (1) an effective interdisciplinary team and (2) a fine-tuned, explicit strategy. How well a multi-skilled team performs depends on the team's collaborative team culture; that is, how well each team member interacts with others. In turn, the level of interaction will contribute to the team's effectiveness in delivering milestones and completing tasks on time and within budget.

The team's vision drives the development of an effective commercialization strategy, which outlines the desires, objectives, needs, and potential restraints of a project. The team must use these elements to carefully craft a path that leads to a successful commercialization effort. Other elements that influence a strategy include research of viable markets, competing technologies, trends, and other principal players.

The fundamental—skeletal—strategy to establish partnerships follows this general course: developing potential partner and funding source lists; generating quality, customer-focused promotional materials; planning an industrial outreach workshop; conducting periodic peer and customer reviews; and conducting customer service, ensuring team synergism, and conducting timely follow-up.

A key component of this fundamental strategy is designing an industrial outreach workshop to select an industrial partner with the skills to successfully commercialize a federally funded, laboratory-developed technology. These workshops eliminate costly and time-consuming one-on-one sessions with a number of companies to relay the same information. In addition, these meetings ensure that all prospective partners receive equal access to the same quality and quantity of information.

Los Alamos National Laboratory has successfully applied this paradigm to several projects, including the large-volume flow-through detector system, headed by Russ Gritz, and polymer filtration, led by Barbara Smith. These two principal investigators work for the Chemical Science and Technology Division at Los Alamos.

Project Team

The first step in taking prototype technology to the commercialization stage is to establish a multidisciplinary team. Team selection is a balancing act: It requires members with a diversity of skills and perspectives, but concurrently calls for members who can effectively communicate a common vision and execute a shared goal. Mutual respect among team members is an essential component. The following table presents the essential members of a commercialization team:

Team Member	Characteristics
Project Leader	In almost every case, the project leader is the technology's inventor. This person possesses the vision that drives the project's direction and momentum.
Technical Support	These individuals consist of technical people involved in the technology's creation and development.
Marketing Support	<p>These individuals function as the key point of contact for commercialization and partnering activities. They are responsible for the following tasks:</p> <ul style="list-style-type: none"> • Gathering primary and secondary market data. • Generating and distributing promotional materials. • Leading, planning, and preparing a workshop. • Developing databases for contacts, potential partners, and others.
Logistics Support	<p>Depending on the size of the workshop or budget constraints, this task is conducted by a protocol office or by marketing support. This person has the following responsibilities:</p> <ul style="list-style-type: none"> • Mailing registration materials. • Tracking registered participants and fees. • Securing hotel accommodations, assessing space required to conduct a workshop, and arranging for audio-visual equipment.
Industrial Partnership Office Support	This individual is responsible for establishing an agreement between the Laboratory and an industrial partner. This person is primarily responsible for protecting all intellectual property.
Miscellaneous Support	Other individuals that may play a role in partnership activities include counsel from outside sources, such as patent and legal offices; Laboratory program managers; DOE program and project sponsors; outside marketing consultants; industry representatives; and graphics and general administrative support staff.

Commercialization Strategy

The key to executing a successful commercialization strategy is to prepare a well-developed commercialization plan. By establishing key tasks, assignments, and milestones, the commercialization team can forecast—and therefore address in real time—potential barriers or bottlenecks to successful commercialization. By addressing such issues before they actually take place, the commercialization team can save significant time, money, and personnel issues. Two key components drive the development of a successful commercialization plan.

The first component consists of a detailed analysis of a specific, visible target market and a clear understanding of the target market's requirements. The technology should exceed these requirements when compared to conventional and competing developmental technologies. In other words, the technology should be "faster, cheaper, and better" than its competition. Therefore, the commercialization plan should echo these requirements by providing substantive data and by following a logical pattern of issues definition, decision trees, stop/go measures, and exit plans.

The second component consists of a clear and concise assessment of the team's expectations and requirements of an industrial collaboration. This assessment will (1) influence the project's direction and (2) will impact factors such as time, money, and resource allocation. Consider the following when conducting such an assessment:

- status of the technology in the innovation process.
- intellectual property status.
- base technology and field-of-use applications.
- support of division and laboratory management for commercialization activity.
- the amount of time and effort the team is willing to commit to commercialization activities.
- desired amount of team involvement in post-licensing technical assistance and marketing.
- funding requirements.
- desired scientific flexibility.

The project leader and the team must have a clear, unified understanding of the end goal in its philosophical, fiscal, and programmatic terms. Although this end goal may change as a result of events that take place during the commercialization process, a team that begins with a clear idea of the project's end result will eliminate a number of costly pitfalls, such as frequent backtracking and duplication of effort. Although initially time consuming, this approach dramatically increases the project's chances of success.

Market Research

Before holding a industrial interaction workshop on a particular technology, the commercialization team must conduct extensive market research. The team can conduct an initial literature search through a library resource. The library can provide source documents and abstracts, which the team can review and extract relevant information. Some key information that should be studied includes

- market size
- market potential
- competing technologies
- principal players
- industry trends
- regulatory drivers

The team also should conduct a search for existing marketing studies or research reports to avoid a duplicative and unnecessary effort. Commercially available research reports cost from \$40 to \$3,500 per copy, depending on the depth and source of information.

In most cases, initial market research leads to a more specific information-gathering phase that requires "personal contact." This task requires team members to interact with principal players in industry, such as manufacturers, trade associations, and regulatory agencies. This type of information can help the team assess market potential, recruit potential partners, discover new target industries, and evaluate laboratory technology against conventional and competing methods. Metrics used to compare and evaluate include cost, performance, energy savings, distinguishing features, and other unique benefits.

Industrial Partnership Office Support

A key player during the industrial interaction workshop is an Industrial Partnership Office (IPO) staff member who specializes in one or more types of commercialization agreements. The commercialization team selects an IPO staff member based on its agreement needs. For example, if the team is interested in establishing a Cooperative Research and Development Agreement, it selects an IPO staff member with expertise in such agreements. The IPO staff member's principal responsibilities are as follows:

- discuss agreement options with the team and workshop participants.
- chair negotiating team meetings.
- structure and draft the agreement.
- obtain Business & Patent Law (BPL) approval of the agreement.

Pre-workshop Responsibilities

Before the team expends great effort in setting up a workshop, the IPO staff member must determine the Laboratory's intellectual property position with respect to the particular technology. In addition, the IPO staff member is responsible for guiding the project team on an anticipated agreement structure. The complexity of intellectual property requires that both IPO and BPL constantly advise the commercialization team of the intellectual property position. This constant oversight enables the team to avoid "collisions" with existing partners, as well as mitigating any possibility of subsequent litigation.

Intellectual property issues arise when the Laboratory attempts to double-mortgage a patent or copyright. For example, a project team may wish to license a particular patent portfolio already encumbered under a Cooperative Research and Development Agreement established two years earlier, or perhaps the patent portfolio is jointly owned by the University of California and a private company. In many cases, the project team works with IPO and BPL to develop alternatives to resolve intellectual property issues. The IPO staff member works directly with the assigned patent attorney from BPL, who often requests informal and formal legal opinions on various issues.

Another responsibility of the IPO staff member is to work with the team to ensure that all potential workshop participants execute PIAs, Proprietary Information Agreements (nondisclosure agreements), before the workshop. A PIA provides a legally protected path of exchange for Los Alamos and the participants to discuss proprietary or protected information.

Proprietary or protected information may contain enabling information or any form of data that can provide a company with a "key" to unlock the essential details regarding the invention. Regardless of the Laboratory's intellectual property position (e.g., patent issued or patent pending), if the project team wishes to disclose any protected information (especially enabling information) in its workshop materials, the IPO staff member will work with the team to mark such information with the appropriate conspicuous language.

In many cases, the IPO staff member advises the technical staff to disclose only information that is sufficient to persuade interested parties to become full partners. This strategy minimizes any intellectual property usurpation risk.

Workshop Responsibilities

During the workshop, the IPO staff member discusses relevant agreement(s) with the participants. The IPO staff member also provides informal one-on-one preliminary negotiation meetings with each participant. These meetings enable each participant to enter into confidential discussions and to give and receive information without worrying about a potential competitor.

In these private sessions, the IPO staff member often garners the participant's requirements and needs, the company's interest in entering an agreement, and the company's opinion regarding the development stage of the technology. After the workshop, the IPO staff member provides this information to the project team, which begins the process of narrowing the participant list, re-evaluating the commercialization strategy, and refining or changing the agreement mechanisms to satisfy the strategy.

Post-workshop Responsibilities

After the workshop, the IPO staff member must prepare an agreement that satisfies the team's commercialization strategy. This task includes chairing negotiations on terms and conditions that will be a part of the agreement.

Although the IPO staff member leads this effort, this task requires the full participation of all team members. For example, the technical staff must provide cost and time estimates for collaborations. This information will help the IPO staff member develop an effective Joint Work Statement.

In the case of a license, the IPO staff member determines the best mechanism to place a "value" on a technology. Some approaches include "fair market value," "cost of reproduction," and "cost replacement." Regardless of the mechanism, the IPO staff member relies heavily on the results of the workshop and on the marketing specialists and technical staff who have assimilated information to help answer these complex questions.

The final agreement must satisfy negotiated terms, the project team's objectives, and the Laboratory's legal requirements. The agreement follows this approval process: The IPO staff member approves it, then it is submitted to BPL for approval. Once BPL furnishes its approval, it forwards the agreement to the Los Alamos director for signature.

Creating A List of Potential Partners

The commercialization team can use a number of techniques to compile a list of potential partners: trade shows, conferences, personal interactions, and trade associations. One particularly effective mechanism is to place an advertisement in the Commerce Business Daily. A well-written advertisement will attract a diversity of interested parties, including players in target industries, venture capitalists, and "influencers." These advertisements receive a dozen to more than 100 responses.

An "influencer" is an individual who has no interest in partnering, but rather is someone who acts as a type of information clearinghouse in a given industry. These individuals gather information about innovative, advanced technologies or projects. Their objective is to keep abreast of industry shifts and trends. Some examples of influencers include technical writers who write for an industry trade association or a journalist who writes for environmental publications. Please note that information from Commerce Business Daily advertisements is sometimes extracted and placed in other publications.

In addition to posting a Commerce Business Daily advertisement, the team should conduct a Thomas Register search using Standard Industrial Classification codes generated by initial literature searches. Not only does this activity generate a list of companies operating in the industry of interest, it also provides information on the size and scope of these particular companies. The team can use this latter information to partially assess a company's viability as an industrial partner.

The information gathered from these and other sources yields a database of industrial partners. The team should use this database to document areas of applications of interest, to establish a list of primary points of contact, and to create a chronological log of correspondence with each contact.

Promotional Materials

Developing effective promotional materials is a balancing act: Promotional pieces must not contain any proprietary information, but they must have sufficient information to "whet the appetite" of potential partners. The following information should be addressed in a promotional piece:

- the problem to be solved.
- the technology's features and benefits.
- the technology's stage of development.
- other potential applications of the technology.
- cost and performance data, if available.

Rather than text, use graphics to explain difficult concepts or to indicate size or configuration requirements.

The role of the promotional piece (brochure, flyer, etc.) is to entice interested parties to ask for more detailed information under a PIA. "Fishers" and other information gatherers will hesitate to sign such an agreement; as a result, only seriously interested parties will execute a PIA, pay a workshop fee, and participate in the workshop. This strategy saves the Laboratory time and money.

Registration Materials

The team mails standard registration materials at least two months before the workshop takes place. Information on hotel accommodations and registration fees are included, as are a draft agenda and a PIA. The PIA must be executed before the company is allowed to participate in the workshop. Those companies unable to attend the workshop may obtain a briefing book after the workshop by executing a PIA.

Workshop Materials and Format

Before the workshop takes place, the team assembles a briefing booklet that contains copies of technical, marketing, and technology transfer presentations. Also included in this booklet are a contact list, a reference appendix, and the selection criteria used to choose an industrial partner. Each book contains a Proprietary Information Statement that indicates all material is proprietary and must not be disseminated.

The team designs a relevant graphic that will function as the workshop "logo." The logo is used throughout the materials to show professionalism, uniformity, and continuity. All workshop presentation materials are hand-crafted to target a specific commercial market.

The technical members of the team prepare presentations that are informative and simple to understand. The presentations provide enough information to enable participants to understand the technology's basic concepts, but no enabling components of the technology are discussed.

The marketing members of the team also prepare a presentation, which uses information gathered from previous research. This presentation follows a feature-to-benefit outline common to proposals: It presents the features of the technology that make it more attractive than conventional or competitive technologies under development. Also discussed are capital equipment costs, operating costs, and return-on-investment estimates. The marketing presentation informs potential partners of the specific commercialization timetable and any additional non-technical needs or requirements for the project.

The workshop begins with a welcome from a Laboratory technical division or program office. In the best-case scenario, this introduction is followed by an industrial representative who presents a success story of the positive implications of the technology.

The technology presentations follow. These presentations include a short history of the project, followed by a description of the technology. The marketing presentation builds on the technical description by outlining potential markets, applications, and other non-technical information.

The final presentation comes from the Industrial Partnership Office. This presentation addresses technology transfer mechanisms, deadlines, partnership expectations, and specifics on both the criteria and process for the evaluation of each company's proposal.

While industry participants take an opportunity for lunch on their own, the team convenes to quickly assess the morning activities and to prepare for the afternoon sessions. Another strategy is to hold a working lunch with the participants to further discuss questions related to the morning presentations.

During the afternoon, workshop breakout sessions take place in which companies interact one-on-one with the technical staff. The breakout sessions give company representatives an opportunity to ask the technical staff direct, confidential questions without the presence of competitors. Conversely, technical staff learn more about the industrial participants and gain some knowledge into their specific areas of interest and expertise.

Other potential events at a workshop include hourly demonstrations of the technology (a particularly effect strategy), poster sessions, and a hospitality suite staffed by marketing and Industrial Partnership Office staff. Depending on the amount of pre-workshop contact with marketing and Industrial Partnership Office staff, breakout sessions could be scheduled with them as well.

Peer Review

A few weeks before the workshop takes place, the team should schedule a "peer review" session. Staffed by individuals with a range of expertise and perspectives, this dry-run will help prepare presenters for questions that may be asked of the day of the workshop. This session also helps ensure the clarity and effectiveness of charts, graphs, and other graphics. Presentations should be professional, enlightening, and salable. Staff with the best presentation skills should give the presentations; a technical expert lacking effective presentation skills should avoid presenting at the workshop.

Survey

The team should develop a survey that can help gauge the strong and weak points of the workshop. The survey should solicit comments and suggestions for future workshops.

Follow-Up

The team must complete a number of tasks after the workshop take place. For example, the team should send follow-up mailings to participants. The mailings reiterate deadlines, project objectives, selection criteria, and the evaluation process. Information companies requested at the workshop also should be sent, as well as briefing books to those companies that were unable to attend and signed a PIA. The team should make phone calls to solicit further questions and gauge interest from companies.

The team should hold a de-briefing session—a lessons learned session—to discuss the strengths and weaknesses of the workshop. Agenda items for this meeting include

discussing the results of the survey, addressing lessons learned, providing impressions of perspective partners, and generating a follow-up action-item list.

Proposal Evaluation

At the conclusion of the workshop, the commercialization team invites participants to submit partnership proposals for the technology. Los Alamos grants bidders 60 days to respond to this call.

The team applies a predetermined set of selection criteria it developed to evaluate the proposals. The commercialization team must consider not only the commercialization strategy, but the qualities, expertise, and resources necessary for a company to successfully commercialize the technology.

Examples of selection criteria include

- marketing plan or "vision."
- financial backing.
- technical expertise.
- benefit to U.S. economy.
- agreement desired.

The team tailors the selection criteria to reflect the characteristics, capabilities, resources, and management philosophy desired in an ideal partner. Each criterion must be specific to the desires and requirements of the project team. Each criterion carries a degree of importance; however, all proposals are evaluated more qualitatively than quantitatively.

Cost

Assigning a cost to a workshop is a difficult task. For example, a workshop held one year ago for the large-volume flow-through detector system (LVFTDS) cost approximately \$30,000. However, this workshop was a pilot effort whose costs were due to the staff learning curve.

Los Alamos presently is conducting an analysis of a recent workshop, one for polymer filtration, to track cost and evaluate lessons learned from the pilot LVFTDS workshop.

Conclusion

Conducting a commercialization workshop takes a substantial amount of devoted time to conduct research, establish a networking net, and pay attention to myriad details. Pre-workshop activities alone take as long as six months, whereas the workshop, follow-up activities, and partner selection and negotiations can take as long as another year. However, dedicated effort from each team member can significantly compress this time frame.

For this type of activity to succeed, upper-level management must buy in and support these efforts. Management must create an atmosphere in which a team can work as independently as possible, thereby setting a tone of importance tempered with support and patience during the execution of the commercialization strategy.

As Los Alamos conducts more of these workshops, the easier and more efficient their execution will become. However, the level of effort will not decrease. Increased efficiency and success will lead to a greater demand, and as a result the Laboratory's limited resources will continue to be taxed.

Both Russ Gritz and Barbara Smith have successfully partnered with an appropriate and qualified partner for the most developed application of their technologies. They also are presently negotiating with other collaborators, a result of initial marketing and commercialization efforts.

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