

The Financial Value of STTR for Non-Profit Research

Minimizing the Direct Labor Overhead Rate as a Metric for Success

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Introduction

For non-profit research institutions, managing PhD proposal writing efforts against pre-funded or billable research activities can be a strategic challenge. Additionally, the institution must decide which solicitations or opportunities provide the highest return on investment or most consistent cash flow. The Small Business Technology Transfer (STTR) program is often overlooked in favor of larger grants or Broad Agency Announcement (BAA) solicitations on which to concentrate proposal writing. This white paper seeks to complete an objective analysis using Direct Labor Utilization and Direct Labor Overhead as metrics for performance when a non-profit institution collaborates with a small business entity to seek initial “Phase I” funding through the STTR program.

Background

The Small Business Technology Transfer (STTR) program is a smaller version of the \$2 billion Small Business Innovation Research (SBIR) program based on both contracts and grants awarded through a solicitation and proposal process.¹ These opportunities are reserved for technology savvy small business “for-profit” entities with less than 500 employees. With SBIR and STTR, award selections are based on the innovative significance, the qualifications of the Principal Investigator (PI), and commercialization strategy outlined in the proposal. However with the STTR program, a partnership is required between the small business entity and a qualifying non-profit research institution. More specifically 30% to 60% percent of the total funding must be awarded to and be spent by the non-profit institution for feasibility and adapting the technology to commercialization.

Like SBIR, Phase I STTR awards are usually six months in duration and up to \$100,000 in funds. Phase II awards are normally 24 months and \$750,000 or more. Phase I is reserved for conducting initial research towards technical feasibility of a concept while Phase II continues the research and often produces a working prototype. All federal agencies with annual R&D budgets in excess of \$1 billion maintain an STTR program. Federal law mandates that 0.3% of their R&D budget be allotted towards these contracts and grants. Federal agencies and their approximate annual STTR budgets for both Phase I and II awards are as follows:

<u>Government Agency</u>	<u>Annual STTR Budget</u>
Department of Defense (DoD) ^{2,3}	\$134M
National Institutes of Health (NIH) ^{4,5}	\$70M
Department of Energy (DoE) ^{6,8}	\$15M
National Aeronautics & Space Administration (NASA) ^{8,9}	\$13M
National Science Foundation (NSF) ^{10,11}	\$12M

The largest STTR program (DoD) has two award cycles each year. Solicitations topics are normally posted in January and July, with proposals due in March and September, and selections made in May and November. DoD sub-agency topics and quantity of awards for each bi-annual funding cycle averaged as follows over the last three years:³

<u>DoD Sub-Agency</u>	<u># of Topics</u>	<u># of Awards</u>
Army	20	30
Navy	19	51
Air Force	22	38
Defense Advanced Research Projects Agency (DARPA)	6	9
Missile Defense Agency (MDA)	6	9
Office of the Secretary of Defense (OSD)	3	9

Both SBIR and STTR solicitations are very competitive. Typically 10% to 20% of Phase I SBIR proposals will be selected to receive an award. Even though the number of awards is smaller than SBIR, STTR Phase I win rates average higher (20% to 30%). Using DoD as an example, **Figure 1** shows the historical win rates of the agency's SBIR and STTR programs from published statistics.

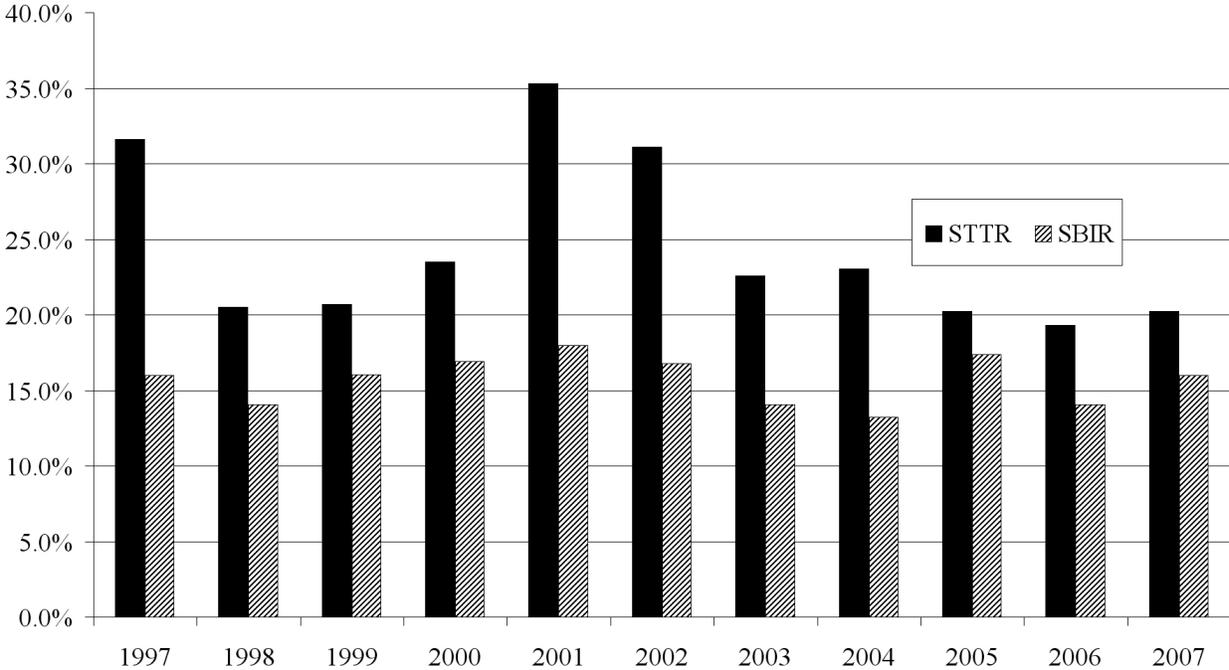


Figure 1 – DoD SBIR and STTR Phase I Win Rates (Awards/Proposals).^{3,12}

Win rates can vary between different agencies year-to-year and for the specific technical topic or solicitation. However, on average one in two Phase I awards will go on to win a Phase II and this statistic should be considered in the overall value of the Phase I proposal process.

The STTR Business Model

Leveraging the above background data, this paper proposes for the non-profit research institution to use a limited number of their available PhD resources to write collaborative STTR proposals with qualifying small businesses. An overview of money flow and effort is shown in **Figure 2**. To submit the idea, the non-profit would partner with a small (for-profit) business entity as a subcontractor receiving up to 60% of the budget if awarded.

Intellectual property (IP) rights must be considered by the non-profit before starting this business model. However, a non-disclosure agreement (NDA) and simple “Letter of Intent” is usually adequate to begin the proposal submittal process. The letter would state the intent to negotiate in good faith by the small business and non-profit on IP rights while not being a legally binding contract. Also, each STTR proposal can be marked proprietary with the exception of the cover page. A more binding contract is needed once the proposal is awarded. A sample STTR legal agreement can be found on the National Institutes of Health (NIH) website.¹³

A typical STTR proposal consists of technical content, PI qualifications or curriculum vitae (CV), commercialization strategy, and budget. Unlike the SBIR program, the non-profit based PhD acting as the Principal Investigator (PI) conducting Phase I research, **would not** be required to join the small business entity. The only exception is with the Department of Energy, which **does require** the PI to join at the time of the award or be an existing employee of the small business. For this model the PI provides the technical content and uses their CV (or credentials) for the proposal. The for-profit small business must provide the commercialization strategy and overall Phase I budget to the proposal.

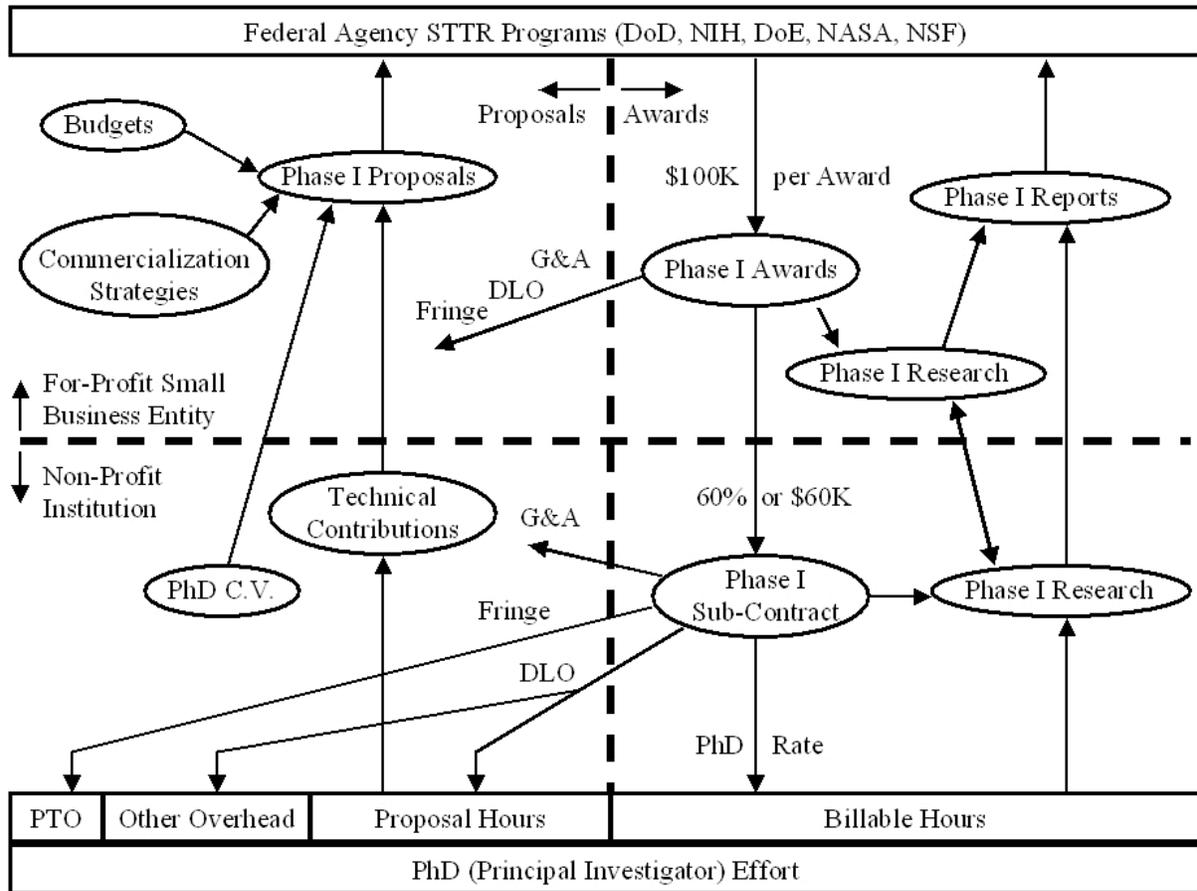


Figure 2 - STTR Business Model for Non-Profit Institutions.

DLU and DLO Analysis

With the exception of growth, Direct Labor Utilization (DLU) and Direct Labor Overhead (DLO) are key performance metrics for a non-profit research institution primarily funded through the federal grant proposal process. **Direct Labor Utilization** (DLU%) is defined as the ratio of direct labor hours worked on awarded projects to all direct labor hours including non-project charged time. **Direct Labor Overhead** (DLO%) rate is the percentage of dollars spent paying direct labor for all activities not billed to a project excluding PTO which is covered in fringe rates. DLO% is applied to direct labor and fringe when bidding proposals or contracts.

This business analysis calculates DLU rates and DLO rates for using a PhD employed by the non-profit to write the technical contribution on STTR proposals. Upon winning an award the PhD will operate through a subcontractor arrangement with the small business entity as the Principle Investigator (PI) for the Phase I award. For the analysis, the following variables are used:

Win Rate (WR%) defined as the percentage of awards per proposals submitted.

PI Hourly Rate (PI_{\$/hr}) rate is the direct labor base rate, calculated using the PI or PhD's salary with a 40-hour work week (52 weeks per year) multiplied by the fringe rate.

General & Administrative (G&A%) rate is the cost of G&A expenses over the total expenses for the business. Typical G&A expense items are accounting, contracts, and purchasing. A G&A rate is calculated over a prescribed period of time and applied to direct labor, fringe, and DLO when bidding proposals or contracts.

Award Amount (A_S) is defined as the 60% subcontracted amount of the total STTR Phase I award.

Award Expense (E_S) includes expenses other than PI salary incurred in the subcontracted STTR Phase I effort.

Other Overhead ($OO\%$) rate is the percentage of time a PhD charges to activities not directly related to billable research (A_{hr}) or proposals (TP_{hr}). Examples are corporate meetings, timesheets, etc.

Using the flow of **Figure 2** and the above variables, the following two equations can be developed for Average Proposal Hours (P_{hr}) versus Direct Labor Overhead ($DLO\%$) and Direct Labor Utilization ($DLU\%$):

$$P_{hr} = \frac{WR\% \times (A_S - E_S) \times [DLO\% \times (1 - OO\%) - OO\%]}{PI_{\$/hr} \times (1 + DLO\%) \times (1 + G\&A\%)} \quad \text{equation 1}$$

$$DLU\% = \frac{1}{1 + DLO\%} \quad \text{equation 2}$$

To test this STTR Phase I non-profit business model, the following typical data set is used:

Principal Investigator Annual Salary:	\$110,000 + 35% fringe
Principal Investigator Rate with Fringe ($PI_{\$/hr}$):	\$71 per hour
Principal Investigator Other Overhead ($OO\%$):	30 minutes per day or 6.25%
Non-Profit General & Administrative ($G\&A\%$):	25%
STTR Average Phase I Non-Profit Award (A_S):	\$60,000 (60% of \$100,000)
STTR Average Phase I Travel Cost per Award (E_S):	\$1,500

Figure 3 plots Direct Labor Overhead ($DLO\%$) against average hours per proposal (P_{hr}) using *equation 1*, for win rates of 10%, 20%, and 30%. Using data from **Figure 3** and *equation 2*, Direct Labor Utilization ($DLU\%$) is plotted against average hours per proposal (P_{hr}) in **Figure 4**.

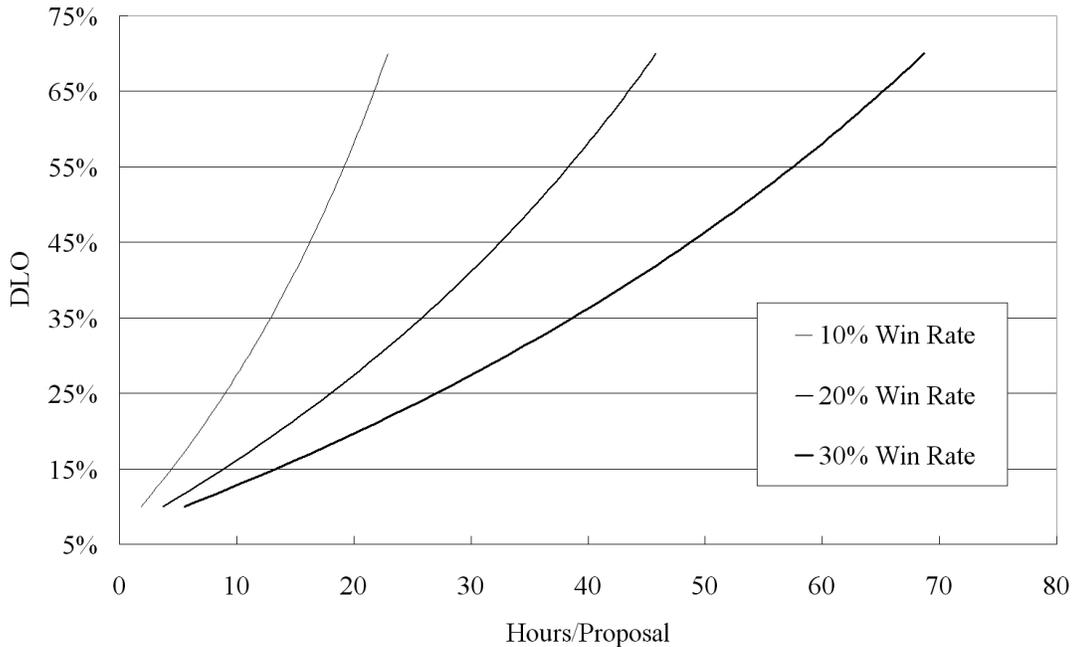


Figure 3 - Direct Labor Overhead ($DLO\%$) versus Average Hours per Proposal (P_{hr}).

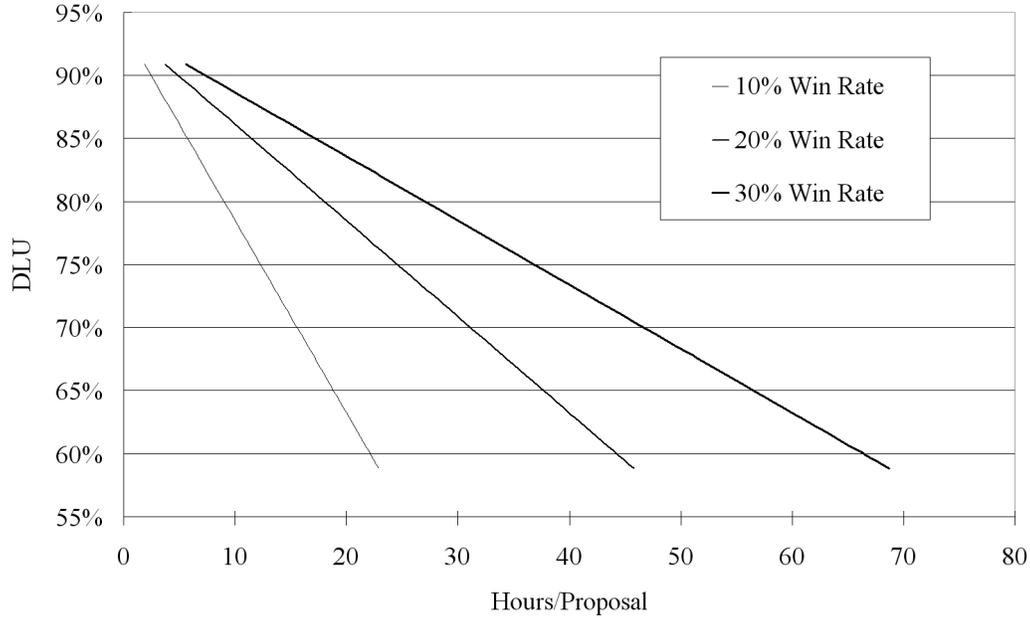


Figure 4 - Direct Labor Utilization (DLU%) versus Average Hours per Proposal (P_{hr}).

As seen in **Figure 3** and **Figure 4**, the impact from varying win rates and average hours per proposal are significant on DLO and DLU. However, these two variables have a canceling effect on each other when studied for a given concept or research idea. As an example, a PhD needs 140 hours to write the first technical contribution for a proposal. The second time the same idea is submitted maybe 30 hours are required to rewrite. Each additional STTR submission for the same idea takes approximately 10 hours to address specifics of the new solicitation. **Table I** demonstrates the re-submission impact on win rate, DLO, and DLU. Using the historical win rate data of the STTR program, an average of three to five submissions could be required for a win. This rate yields a DLO of 51% to 59% and a DLU of 63% to 66%.

Table I - Example of resubmitting a research idea until an STTR Phase I award is secured.

<u>Proposal Submission</u>	<u>Win Rate</u>	<u>Each Proposal</u>	<u>Average Proposal</u>	<u>DLO Rate</u>	<u>DLU Rate</u>
1st	100%	140 hrs	140 hrs	38%	72%
2nd	50%	30 hrs	85 hrs	48%	68%
3rd	33%	10 hrs	60 hrs	51%	66% ***
4th	25%	10 hrs	48 hrs	55%	65% ***
5th	20%	10 hrs	40 hrs	59%	63% ***
6th	17%	10 hrs	35 hrs	62%	62%
7th	14%	10 hrs	31 hrs	65%	61%
8th	12%	10 hrs	29 hrs	71%	58%
9th	11%	10 hrs	27 hrs	76%	57%
10th	10%	10 hrs	25 hrs	80%	56%

*** Historic average STTR win rate of all agencies (20% to 33%)

NOTE: This analysis is based on typical values and general accounting procedures. Before developing a specific business case, the non-profit institution should have the model reviewed against their accounting practices and compliance to Federal Acquisition Regulation (FAR) and Cost Accounting Standards (CAS). Additionally, the legal counsel should review the Intellectual Property (IP) arrangement with the small business entity.

Summary

From this analysis, STTR Phase I efforts can meet or exceed the DLO and DLU objectives of the non-profit research institution. Increased value will come in Phase II awards, where up to \$450,000 may be subcontracted to the non-profit. Cumulative results of Phase I and II, can exceed DLU rates of 80%, while DLO is maintained at less than 25%. Additionally, the STTR program may produce a smoother overall cash flow, than larger programs requiring more proposal effort and less solicitation opportunities. Risk is also mitigated by the smaller but more frequent opportunities.

However before starting the STTR proposal process, careful attention is needed by the PI and associates to insure the given research idea has commercial potential and will make a competitive proposal. STTR agency data should be studied on available Phase I budgets and current win rates. Also, early communication and feedback from the solicitation’s program manager cannot be overstated. With a fixed budget, each supporting STTR agency can only grant a certain number of awards. Based on popularity of a given solicitation, the percentage of winning proposals could be low. Additionally, review by management is needed for the predicted DLU and DLO rates versus project proposal efforts to ensure cash flow and supplementary financial objectives are met. Other overhead factors may need to be considered such as the PI’s continuing education, conferences, current funded research, and publishing activities.

Secondly, selecting the small business entity with which to partner should not be taken lightly. The non-profit must carefully consider future IP rights, licensing by the small businesses, and other potential partners. Also, the small business will be administratively responsible for the proposal and ultimately responsible for the commercialization. If successful, this relationship will be a three-year partnership through Phase I and II.

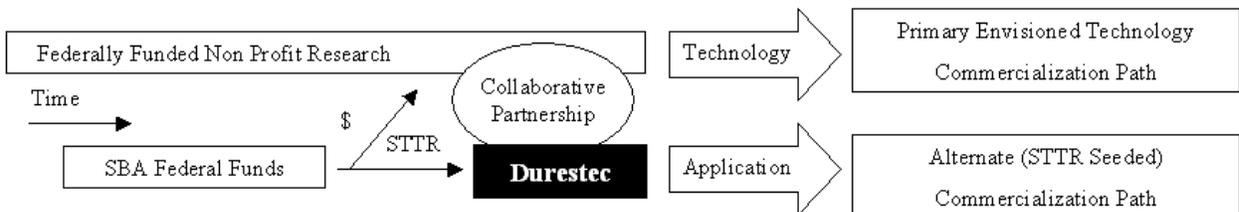
In summary, a well-managed STTR program may present one of the highest value and lowest risk funding opportunities for the non-profit research community.

References

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About the Company

Durestec LLC is a small business entity conducting applied research in sensor and sensor networking technologies for defense and homeland security. Leveraging primarily STTR opportunities, Durestec collaborates with academia and non-profit research institutions in alternate commercialization of core research. Durestec can provide a "Team B" approach to developing new applications (and funding) for emerging technologies. Available on the Durestec website (with this white paper) is a spreadsheet for estimating STTR based ROI, cash flow, DLO, and DLU. Durestec also provides consulting services to small business and non-profits for SBIR and STTR efforts.



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