SBIR/STTR Proposals: Successful strategies for startups with university-generated technologies

Kirk J. Macolini
President
Centurion Technology
www.CenturionTechnology.com
Kirk@CenturionTechnology.com
(607) 277-1570
Agenda

• Introduction
• Successful Strategies
  – Choose Wisely
  – Invest in a proposal
  – Use a good process
  – Build a strong team
  – Develop the big picture
  – Write a strong proposal
• Agency Overview
• Questions
Who is this guy???? (Kirk Macolini)

- Founded Centurion Technology in 2002 to help small business compete effectively against SBIR mills
- Worked on 100s of proposals over the last decade
- In the last 4 years alone 117 successfully funded proposals (primarily SBIR/STTR – but also other mechanisms (i.e. BAA, CMDRP, etc) worth over $40 million.
- National average: Phase I - ~12%; Phase II - ~40%
- Centurion Technology: Phase I - ~30%; Phase II - ~60%
Small businesses from all sectors
Many with University Roots
Who are you?

• 15-30 second quick intro
• Who are you:
• What is your technical field
• Do you have special interest in any particular agency? Or other special SBIR issue?

I’ll do my best to tailor the discussion on the fly!

You can ask topic RELEVANT questions as we go.
STRATEGY 1: CHOOSE WISELY
STRATEGY: Choose Wisely

• Preparing a winning SBIR/STTR proposal is a mountain of work.
• The key is to pick battles you can win
• Choosing the right topic/agency is the most overlooked (and perhaps most important) ingredient of success
• Factors in play include:
  – Technology vs. capability approach
  – Agency (and sub-agency) selection
  – Topic selection
Technology vs. Capability

- Technology Companies are focused on developing specific technology (ies).....regardless of whether or not they win an SBIR
- Capability companies have smart people who can solve problems...and use this capability to opportunistically compete for awards
- The result is a tradeoff between success rates and opportunities
Technology vs. Capability Approach

TECHNOLOGY
CAPABILITY

Topics
proposals
proposals
proposals
proposals
proposals
proposals

proposals
proposals
proposals
proposals
proposals
proposals

$\$$ Award
$\$$ Award
$\$$ Award
$\$$ Award
$\$$ Award
“Concentrate your energies, your thoughts and your capital.... The wise man puts all his eggs in one basket and watches the basket.” Andrew Carnegie
Agency Guidance

- Department of Defense: $1.1 B
- National Institutes of Health: $717 M
- Department of Energy: $180 M
- NASA: $161 M
- NSF: $150 M

- USDA: $19.3 M
- Department of Homeland Security: $13.4 M
- Environment Protection Agency: $12.6 M
- Department of Transportation: $8.6 M
- Department of Commerce: $4.8 M
- Department of Agriculture: $4.7 M
Narrow vs. Open Topics
Agency selection

- Seems obvious – but it’s not
- Lot’s of overlap in projects funded by various agencies
- Each agency takes a different perspective
  - EX: DoD, NASA are trying to solve problems
  - EX: NIH, DoE are trying to promote research in general
  - EX: NSF is trying to promote research AND stimulate successful commercialization
- This leads to varying levels of acceptance by different agency
- Where to apply can be extra challenging when considering multiple granting agencies
CASE STUDIES: NIH vs. NSF

- APAMA Medical: Catheter Ablation device for atrial fibrillation
- STERLING BIOMEDICAL: Anti-microbial polymer for Catheters
- Lumiphore: Reporter molecule for DNA screening
CASE STUDIES: NIH vs. NSF

- Catheter Ablation device for atrial fibrillation
- Anti-microbial polymer for Catheters
- Reporter molecule for DNA screening

APAMA Medical
STERLING BIOMEDICAL
Lumiphore

NSF proposal = Award
NSF proposal = Award
NSF proposal = Award
CASE STUDIES: NIH vs. NSF

• On the surface all proposals where ideal for NIH
• NIH has a far larger budget compared to NSF
• So why were proposals soundly rejected by NIH funded by NSF
  – Projects were all development projects (NIH tends to be more clinical/evaluation focused, NSF tends to be more engineering focused)
  – Strong commercial stories are important at NSF, NIH barely cares
• Take away message – **do your homework!**
  – Talk to program managers
  – Study previous awards abstracts to see what the agency funds
  – Look at websites of previous winners
Navigating NIH

SBIR/STTR
Budget Allocations
Navigating NIH

- Each subagency has its own funding policy
- Some publish paylines (10-90, 10 is best score)
- You can request assignment to a subagency (otherwise NIH will choose)
- Choosing the right sub agency can be the difference between success and failure

<table>
<thead>
<tr>
<th>Agency</th>
<th>SBIR</th>
<th>STTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIAID</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>NHLBI</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>NIAMS</td>
<td>26</td>
<td>26</td>
</tr>
</tbody>
</table>
Case Study: Navigating NIH

- Developing an intervention targeted at reducing smoking rates
- National Cancer Institute has largest budget within NIH
- National Cancer Institute runs most smoking cessation research
- An obvious choice, but.....
Case Study: Navigating NIH

• The **WRONG** choice
• Proposal was targeted at National Institute on Drug Abuse (NIDA), and was funded...based on a score that would not have been funded at NCI
• What??? NIDA has 11th largest budget, ~1/5 of NCIs
• Need to do homework on NIH agencies
  – Understand overlap between agencies
  – Look at success rates (data available on NIH SBIR homepage)
  – Look at competitiveness of funded projects
  – Look at funding commitments
## NIH Phase I SBIRs 2012

<table>
<thead>
<tr>
<th></th>
<th>Totals</th>
<th>Below Average</th>
<th>Above Average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NIDCR</strong></td>
<td>57</td>
<td>8</td>
<td>14.0%</td>
</tr>
<tr>
<td><strong>NIMH</strong></td>
<td>89</td>
<td>12</td>
<td>13.5%</td>
</tr>
<tr>
<td><strong>NINDS</strong></td>
<td>245</td>
<td>33</td>
<td>13.5%</td>
</tr>
<tr>
<td><strong>NIDDK</strong></td>
<td>310</td>
<td>31</td>
<td>10.0%</td>
</tr>
<tr>
<td><strong>NCI</strong></td>
<td>786</td>
<td>76</td>
<td>9.7%</td>
</tr>
<tr>
<td><strong>NINR</strong></td>
<td>52</td>
<td>5</td>
<td>9.6%</td>
</tr>
<tr>
<td><strong>NCCAM</strong></td>
<td>34</td>
<td>3</td>
<td>8.8%</td>
</tr>
<tr>
<td><strong>NIAMS</strong></td>
<td>185</td>
<td>16</td>
<td>8.6%</td>
</tr>
<tr>
<td><strong>NIBIB</strong></td>
<td>247</td>
<td>17</td>
<td>6.9%</td>
</tr>
<tr>
<td><strong>NCATS</strong></td>
<td>48</td>
<td>32</td>
<td>66.7%</td>
</tr>
<tr>
<td><strong>NIDA</strong></td>
<td>59</td>
<td>22</td>
<td>37.3%</td>
</tr>
<tr>
<td><strong>†OD ORIP-SEPA</strong></td>
<td>32</td>
<td>11</td>
<td>34.4%</td>
</tr>
<tr>
<td><strong>NIAAA</strong></td>
<td>28</td>
<td>9</td>
<td>32.1%</td>
</tr>
<tr>
<td><strong>NHGRI</strong></td>
<td>41</td>
<td>12</td>
<td>29.3%</td>
</tr>
<tr>
<td><strong>NIDCD</strong></td>
<td>43</td>
<td>12</td>
<td>27.9%</td>
</tr>
<tr>
<td><strong>NICHD</strong></td>
<td>183</td>
<td>38</td>
<td>20.8%</td>
</tr>
<tr>
<td><strong>NIGMS</strong></td>
<td>355</td>
<td>71</td>
<td>20.0%</td>
</tr>
<tr>
<td><strong>NIMHD</strong></td>
<td>30</td>
<td>6</td>
<td>20.0%</td>
</tr>
<tr>
<td><strong>NEI</strong></td>
<td>103</td>
<td>20</td>
<td>19.4%</td>
</tr>
<tr>
<td><strong>NIEHS</strong></td>
<td>88</td>
<td>16</td>
<td>18.2%</td>
</tr>
<tr>
<td><strong>NIEHS</strong></td>
<td>407</td>
<td>73</td>
<td>17.9%</td>
</tr>
<tr>
<td><strong>NIAID</strong></td>
<td>550</td>
<td>98</td>
<td>17.8%</td>
</tr>
<tr>
<td><strong>NLM</strong></td>
<td>29</td>
<td>5</td>
<td>17.2%</td>
</tr>
<tr>
<td><strong>NIA</strong></td>
<td>233</td>
<td>39</td>
<td>16.7%</td>
</tr>
</tbody>
</table>

**Totals**: 4,234 665 15.71% $153,942,015
## NIH Phase II SBIRs 2012

### Totals

<table>
<thead>
<tr>
<th>Agency</th>
<th>Projects</th>
<th>Awards</th>
<th>Percentage</th>
<th>Total $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totals</td>
<td>901</td>
<td>277</td>
<td>30.74%</td>
<td>$165,981,802.00</td>
</tr>
</tbody>
</table>

### Below Average

<table>
<thead>
<tr>
<th>Agency</th>
<th>Projects</th>
<th>Awards</th>
<th>Percentage</th>
<th>Total $</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIDDK</td>
<td>70</td>
<td>21</td>
<td>30.0%</td>
<td>$13,396,055</td>
</tr>
<tr>
<td>NCCAM</td>
<td>7</td>
<td>2</td>
<td>28.6%</td>
<td>$1,114,027</td>
</tr>
<tr>
<td>NINR</td>
<td>4</td>
<td>1</td>
<td>25.0%</td>
<td>$159,649</td>
</tr>
<tr>
<td>NINDS</td>
<td>41</td>
<td>10</td>
<td>24.4%</td>
<td>$6,216,652</td>
</tr>
<tr>
<td>NIMHD</td>
<td>17</td>
<td>4</td>
<td>23.5%</td>
<td>$1,518,570</td>
</tr>
<tr>
<td>NCI</td>
<td>145</td>
<td>27</td>
<td>18.6%</td>
<td>$15,993,999</td>
</tr>
<tr>
<td>NIAMS</td>
<td>28</td>
<td>5</td>
<td>17.9%</td>
<td>$2,220,089</td>
</tr>
<tr>
<td>ORIP-SEPA</td>
<td>7</td>
<td>1</td>
<td>14.3%</td>
<td>$1,031,463</td>
</tr>
</tbody>
</table>

### Above Average

<table>
<thead>
<tr>
<th>Agency</th>
<th>Projects</th>
<th>Awards</th>
<th>Percentage</th>
<th>Total $</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCATS</td>
<td>15</td>
<td>9</td>
<td>60.0%</td>
<td>$6,066,803</td>
</tr>
<tr>
<td>NIDA</td>
<td>17</td>
<td>10</td>
<td>58.8%</td>
<td>$5,833,735</td>
</tr>
<tr>
<td>NIMH</td>
<td>37</td>
<td>17</td>
<td>45.9%</td>
<td>$8,550,754</td>
</tr>
<tr>
<td>NEI</td>
<td>30</td>
<td>13</td>
<td>43.3%</td>
<td>$7,232,500</td>
</tr>
<tr>
<td>NIAAA</td>
<td>15</td>
<td>6</td>
<td>40.0%</td>
<td>$3,485,755</td>
</tr>
<tr>
<td>NIGMS</td>
<td>81</td>
<td>32</td>
<td>39.5%</td>
<td>$17,475,290</td>
</tr>
<tr>
<td>NICHD</td>
<td>35</td>
<td>13</td>
<td>37.1%</td>
<td>$6,684,036</td>
</tr>
<tr>
<td>NIDCD</td>
<td>11</td>
<td>4</td>
<td>36.4%</td>
<td>$2,588,590</td>
</tr>
<tr>
<td>NIEHS</td>
<td>17</td>
<td>6</td>
<td>35.3%</td>
<td>$2,228,182</td>
</tr>
<tr>
<td>NIAID</td>
<td>93</td>
<td>32</td>
<td>34.4%</td>
<td>$27,088,299</td>
</tr>
<tr>
<td>NHGRI</td>
<td>15</td>
<td>5</td>
<td>33.3%</td>
<td>$2,851,095</td>
</tr>
<tr>
<td>NIA</td>
<td>57</td>
<td>19</td>
<td>33.3%</td>
<td>$8,361,442</td>
</tr>
<tr>
<td>NIDCR</td>
<td>22</td>
<td>7</td>
<td>31.8%</td>
<td>$4,111,105</td>
</tr>
<tr>
<td>NHLBI</td>
<td>98</td>
<td>31</td>
<td>31.6%</td>
<td>$21,627,407</td>
</tr>
</tbody>
</table>
Topic selection is important

• Just because you have a good hammer doesn’t mean everything is a nail. Technology Companies tend to try squeeze their technology into inappropriate topics. End result is proposals with virtually no chance of winning.

• It’s not enough to be able to solve a problem, you have be able to solve it better then (nearly) everyone else. Capability companies try to solve every problem, not just the ones they can do very well. End result is proposals with virtually no chance of winning.
Choosing a Topic

• Call topic author (if appropriate) learn everything you can
• Ask yourself some hard questions
• Does it match the topic?
• Is your solution strong?
• Is it innovative? (innovation vs. evolution)

• Are you prepared to invest in this opportunity????
STRATEGY 2: INVEST IN A PROPOSAL
STRATEGY: Invest in a Proposal

• Winners view proposals as an investment not a binary event
• Less Proposals for More Awards (This is a quality game not a quantity game)
• Put you best effort in (or somebody else will)
• A proposal is a product you have invested in – the key is capitalize on that investment
• A rejected proposal may be
  – Submitted to another agency
  – Resubmitted to the same agency
"I always tried to turn every disaster into an opportunity." John D. Rockefeller
Resubmitting a Proposal

- NIH and NSF allow you to resubmit a proposal 1 time
- NIH expects special introduction
- Other agencies you need to find a new relevant topic
- Learn from previous reviews
- If your changing agencies makes sure your tailoring to that agency
STRATEGY 3: USE A GOOD PROCESS
STRATEGY: Use a good process

- Start early!!! Last minute proposals are losers
- Don’t drink your own Kool Aid
- Don’t write a proposal, engineer a proposal
- Use untainted people to red team your proposal
- Leave enough time for partners to provide input.
  - Most Universities need 10 business days to provide administrative info

“Before everything else, getting ready is the secret of success.” Henry Ford
# Typical Proposal Process

<table>
<thead>
<tr>
<th>Weeks Out</th>
<th>tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-8</td>
<td>Choose topic, contact topic author, assess strengths weaknesses, and mitigate weaknesses</td>
</tr>
<tr>
<td>5</td>
<td>Outline – check if it still is viable</td>
</tr>
<tr>
<td>4</td>
<td>Draft Proposal</td>
</tr>
<tr>
<td>3</td>
<td>Iterate based on feedback from key partners</td>
</tr>
<tr>
<td>2</td>
<td>Iterate based on red teaming proposal</td>
</tr>
<tr>
<td>1</td>
<td>Finalize proposal</td>
</tr>
<tr>
<td>0</td>
<td>Submit early</td>
</tr>
</tbody>
</table>
STRATEGY 4: BUILD A STRONG TEAM
STRATEGY: Who is the Competition???

• Remember: a small business is 500 employees
  – Are a 5 person company and a 500 person company really in the same league?

• Many seasoned SBIR firms:
  – Physical Optics Corporation [330 Phase II awards, $285M]
  – Physical Sciences [297 Phase II awards, $255M]
  – Creare [271 Phase II awards, $213M]
  – Intelligent Automation [230 Phase II awards, $170M]
  – Radiation Monitoring Devices [223 Phase II awards, $200M]

• Previous SBIR/STTR awards place a firm at an advantage
  – Preliminary data, familiarity with program manager
David can beat Goliath
Partner, Partner, Partner!

- Improve the caliber of personnel with consultants
  - Universities are great sources of talent
- Improve capabilities with subawards
  - Large and Small businesses, Universities
## Partner with the Primes for DoD and NASA

<table>
<thead>
<tr>
<th>Company</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockheed Martin Corp.</td>
<td>$14,983,515,367</td>
</tr>
<tr>
<td>Boeing Co.</td>
<td>$10,838,231,984</td>
</tr>
<tr>
<td>Northrop Grumman Corp.</td>
<td>$9,947,316,207</td>
</tr>
<tr>
<td>General Dynamics Corp.</td>
<td>$6,066,178,545</td>
</tr>
<tr>
<td>Raytheon Co.</td>
<td>$5,942,575,316</td>
</tr>
<tr>
<td>KBR Inc.</td>
<td>$5,467,721,429</td>
</tr>
<tr>
<td>Science Applications International Corp.</td>
<td>$4,811,194,880</td>
</tr>
<tr>
<td>L-3 Communications Inc.</td>
<td>$4,236,653,555</td>
</tr>
<tr>
<td>Computer Sciences Corp.</td>
<td>$3,435,767,906</td>
</tr>
<tr>
<td>Booz Allen Hamilton Inc.</td>
<td>$2,779,421,015</td>
</tr>
<tr>
<td>ITT Corp.</td>
<td>$2,582,618,798</td>
</tr>
<tr>
<td>Hewlett-Packard Co./EDS</td>
<td>$2,570,144,924</td>
</tr>
<tr>
<td>Harris Corp.</td>
<td>$2,206,815,088</td>
</tr>
<tr>
<td>BAE Systems</td>
<td>$1,952,973,818</td>
</tr>
<tr>
<td>United Technologies Corp.</td>
<td>$1,631,704,120</td>
</tr>
</tbody>
</table>
Seeking SBIR funding for preclinical studies on a new therapeutic for capillary leak and edema.

As a new start-up, they had limited facilities so the animal experiments would need to be outsourced, but only 33% could be outsourced in Phase I.

STTR grant allowed them to allocate 60% of the award for the animal experiments.

Partnership with a researcher at the Medical College of Wisconsin led to 2 successful STTR projects.
STRATEGY 5: DEVELOP THE BIG PICTURE
Develop a big picture story as an outline

• What is the problem?
• What is the solution?
• Why is this better than competing solutions
• Think in term of proving a hypothesis (especially in Phase I)
• Why is the team appropriate
• What is the plan for commercialization/transition

Does the big picture pass muster
You’re an engineer...be an engineer

- Identifying problems early in the proposal development proposal is critical
- KILL – fatally flawed proposal concepts
- Repair – flaws before spending time writing
STRATEGY 6: WRITE A STRONG PROPOSAL
Pass the skim test

• Reviewers may have 30+ proposals each 25+ pages
  – Do you really think they read all of them cover to cover?
• You need to get a full read by
  – Having a compelling first page
  – Provide compelling imagery to pass the skim test
• Make your key concepts visual
• Don’t actively fail the skim test
• Make your document look like a professional document
Convey the Big Ideas

- What is the technology
- What is the “innovative nugget” – think innovation not evolution
- Understand the need
- Understand the agency
- Consider the competition
- Sell the team and facilities
- Present a reasonable commercialization plan
How should I Write a Proposal

• Proposal is written in a similar style as a peer-reviewed journal article...
• ...BUT is NOT and Academic exploration – it needs concrete goals, objectives, and measures of success
• Write concisely
• Use visuals to convey big ideas
  – Mock-up interfaces to software
• Cite your peers (especially if they might be reviewers), show you understand the field
• Avoid sloppy mistakes
Think like a reviewer

- Understand who the Agency uses for reviewers
- Don’t leave questions unanswered
- Explain how the research establishes proof of concept, with hard goals
- Explain why you didn’t take a different approach
- Provide alternative approaches for tasks that create dependencies
- Define measures of success – be quantitative
- Reviewer perceptions are constantly evolving

“\textit{It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change.}” Charles Darwin
Avoid commons pitfalls

- Fail to demonstrate innovation (innovative in the realm of commercial products is different from innovative research)
- Overly ambitious proposals give the impression of lack of understand of the challenges
- Fail to convey advantages over competing approaches
- Lack of a hypothesis and/or concrete measures of success
- Lack of experimental detail (workplan should be meat of proposal)
- Fail to demonstrate significance
- Lack of understanding of agency needs
AGENCY OVERVIEW
Best resources

• **SBIR Gateway**

• **Government’s SBIR site**
  - DoD
    - [http://www.dodsbir.net](http://www.dodsbir.net)
  - NIH
    - [http://grants.nih.gov/grants/funding/sbir.htm](http://grants.nih.gov/grants/funding/sbir.htm)
  - NSF
  - DoE
    - [http://www.er.doe.gov/sbir/](http://www.er.doe.gov/sbir/)

• NASA
  - [http://sbir.gsfc.nasa.gov/SBIR/SBIR.html](http://sbir.gsfc.nasa.gov/SBIR/SBIR.html)
QUESTIONS