

HOW TO START AN AEROSPACE BUSINESS WITH LIMITED RESOURCES

A 3-Part Speaker Series Hosted by the AIAA LA/LV Young Professionals
& Co-Sponsored by IEEE LA & OC Sections

SESSION 1: TECHNOLOGY TRANSFER, SBIRs, AND NON-DILUTIVE FUNDING

Speakers: Dennis Wonica & Brett Cornick + Q&A

A FREE Virtual Event on Monday, October 26th 7-8:30pm PT

Technology Transfer, SBIRs, + Non-Dilutive Funding Sources

26 October 2020

Presented through:

AIAA Young Professionals Program

Support from Following Organizations:



Acknowledgements

- This YP presentation has been graciously planned & supported by the following societies:
 - AIAA-LA
 - IEEE-LA & OC
- They are always seeking new volunteers & new members; please contact:
 - AIAA-LA: Aldo, aldomart@usc.edu
 - IEEE-LA: Alek, aleksander.babic@ieee.org
 - IEEE-OC: Irvin, irvinbhuang@gmail.com

Some Upcoming Events



Volunteers are needed for all AIAA activities, please contact cgsonwane@gmail.com



AIAA LA-LV Section

e-Happy Hour !

Featuring Science, Sci-Fi and Media with Mr. André Bormanis

Networking with aerospace & media professionals, students and educators, young and experienced !

Thursday, October 29, 2020, **6:30 PM - 8 PM** ([Add to Calendar](#))

[RSVP and Information](#)

The Next Mysteries on Mars

Special Fall STEM Outreach Event (via ZOOM)

- Learn about the latest Mars mysteries
- Discover what the next rover mission has planned
- Experience driving on Mars in a Rover Simulation
- Fly over a Martian Crater in a Mars Helicopter

Friday, November 6th, 2020

4-6pm PST

Open to audiences of ALL ages

Cost: Free (must register beforehand using RSUP link)

6 Raffle
Winners will
each receive
a \$25 Amazon
gift card!

Live Q&A
to follow!

Amazing Videos
and Demos will
be shown!



Questions? Email Fred Lawler at fredlawler@hotmail.com
Sponsored by AIAA and IEEE STEM Outreach Committees

Agenda

- 1st speaker: Brett Cornick
 - Topic: overview of tonight's subjects, deep dive into technology transfer process and non-dilutive funding sources
- 2nd speaker: Dennis Wonica
 - Topic: deep dive into SBIR process and how government funding awards work
- Q&A session with both speakers
- Raffle for two \$50 Amazon gift cards

Brett Cornick



- BS Chemical Engineering, USC '16
- MS Materials Science, UCLA '18
- 4+ years of experience commercializing materials technologies with various Los Angeles start-ups
- Involved in commercialization process of over 10 technologies licensed through technology transfer
- Served as core team member on multiple SBIR award contracts, and authored multiple proposals as PI
- 2 summers research experience at LLNL
- Current Head of Technology at Epic Advanced Materials
- Current Young Professionals Chair for AIAA LA/LV Section

What is Technology Transfer?

- Transfer of knowledge, data, or intellectual property from a university or agency to the public
- Usually done through formal licensing
- Many steps to the process, but entrepreneurs are mostly concerned with the license negotiation and commercialization steps
- Most research universities and government agencies (DoD, DoE, NASA, etc.) have some sort of tech transfer program
- Anyone can license a technology, but it is up to the inventor and owner of the IP to decide who they want to license to
- Most common licensee is small businesses

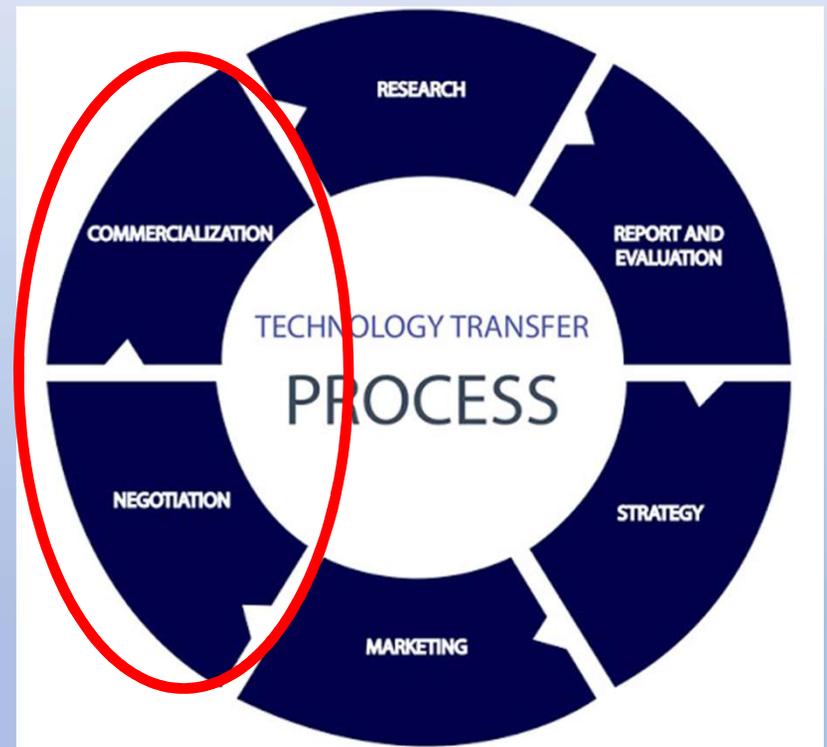


Image: <http://siddhast.com/service/technology-transfer/>

What is SBIR?



SBIR
America's Seed Fund

- Small Business Innovation Research
- Program that encourages US-based small businesses to engage in Federal Research that holds promise for commercialization
- Helps federal government meet their research and development goals while fostering the participation of small businesses that may traditionally be at a disadvantage in the field
- Many government agencies post SBIR solicitations including DoD, DoE, EPA, and NASA
- Must qualify as a Small Business Concern
- All work performed during SBIR award period remains wholly owned by the small business

What is Non-Dilutive Funding?

- Non-dilutive funding is money that a business receives that does not require them to give up any equity (it does not *dilute* shares)
- Many forms: **grants**, loans, royalties, tax credits, crowdfunding
- SBIR awards are an example of non-dilutive funding



Image: <https://lms.boomstartup.com/p/non-dilutive-funding>

How Can These Resources Help You Start a Business?

- Technology transfer can provide a higher TRL starting point for a commercially viable technology which allows small businesses to bypass much of the initial R&D work
- Non-dilutive funding sources (grants especially) provide access to the funding required to perform much of the initial business development or R&D work
- SBIR awards even assist with product-market fit between a small business and a targeted government customer



Image: <https://www.ryerson.ca/news-events/news/2019/03/getting-started-as-a-ryerson-entrepreneur/>

Deeper Dive: Technology Transfer



Key Questions:

- How do I find the right tech?
- What is the licensing process?
- How do I build credibility and make my business an attractive licensee?
- How are licensees selected?
- How much will this cost me?
- What if the technology I like needs significant more R&D work before it can be commercialized?

How to Find Licensable Tech

- Research papers
- University/agency tech transfer offices
- Catalog of available technologies is usually online (example: <https://usc.flintbox.com/#technologies>)
- Phone calls are still the best way to find out information!
- Some companies provide services to assist with technology transfer process (TechConnect, TechLink, etc.)



**NASA TECHNOLOGY
TRANSFER PROGRAM**

BRINGING NASA TECHNOLOGY DOWN TO EARTH



NASA Patent Portfolio

Image: <https://technology.nasa.gov/patents>

The Licensing Process

1. Find an interesting technology (with commercial potential!) in a field that you are familiar with
2. Contact technology transfer office
3. Contract negotiation
4. Commercialization efforts
5. Revisit benchmarks and goals
6. Further research



Image: <https://unicornomy.com/what-is-licensing-examples-licensing-business-model-types-of-licensing-agreement-template/>

How to Build Credibility



- You should be able to demonstrate some ability or knowledge in the field of the technology you are trying to license
- Leverage “consultants” and “advisors” on your team
- Demonstrate an ability and willingness to devote significant effort to the project
- Any past experience with product development or commercialization is a big help
- More information on this topic will be provided in session 2 of this speaker series – date TBA in November!

Tips and Additional Info

- Prices for licensable tech range from free(!) to several thousands of dollars
- During license negotiations, many different factors can affect the price that you will pay for a technology (commercial sector, region, inventor involvement, etc.)
- Focusing initially on a narrow commercial sector in your own geographic region can keep licensing fees very low while you get your business off the ground
- A focused start-up is more likely to succeed than a start-up that tries to solve everyone's problems!
- If you anticipate a good amount of R&D required for commercial success, involvement of the original inventor should be written into license agreement

Pairing Technology Transfer with SBIRs

- When paired together, technology transfer programs and non-dilutive funding sources like SBIR awards can create a starting point for businesses that have limited capital resources and limited internal R&D capabilities
- Tech transfer provides the product, SBIR provides the funding and the market-fit (this is a bit of a simplification but still good for looking at the big picture!)

Past Examples

SBIR Solicitation: DoD Topic #A16-101: Self-Healing/Self-Routing Wiring

Technology Transfer Pairing: In Situ Wire Damage Detection and Rerouting System (NASA)



<https://technology.nasa.gov/patent/KSC-TOPS-6>

SBIR Solicitation: DoD Topic #N81-001: Extended Service Life of Transparent Armor

Technology Transfer Pairing: Polymer Coatings for Enhanced and Field-Repairable Transparent Armor (NRL)



<https://www.nrl.navy.mil/news/releases/nrl-develops-lighter-field-repairable-transparent-armor>

SBIR Solicitation: DoD Topic #AF18B-T003: Electronically Dimmable Eye Protection Devices (EDEPD)

Technology Transfer Pairing: Energy-Efficient Optoelectronic Smart Window (U of Illinois)

NSF I-Corps

- National Science Foundation program for very early-stage start-ups and university groups
- Focused on customer discovery and evaluating product market-fit
- Program centered around stakeholder interviews
- National program provides \$50,000 for customer discovery efforts
- Local NSF nodes provide intro programs that are free and can provide a lot of insights into matching a technology with the correct market

Dennis Wonica



- 40 years experience in advanced technology development in the aerospace sector
- Founder of four separate technology companies
- Has presented, moderated, and testified during events regarding the SBIR process and government commercialization efforts
- Current Enterprise Chair for AIAA LA/LV Section

SBIR/STTR Basics

- **Small Business Innovation Research (SBIR)**
3.2% of extramural research budget for agencies with budget > \$100 M/yr.
~\$3.2 billion min. spend each year
- **Small Business Technology Transfer (STTR)**
0.45% of extramural research budget for agencies with budget > \$1B/yr.
~\$450 million min. spend each year

Phase I

Concept Development
6 months – 1 year
~ \$50,000 – \$256,580
~ 16% Success Rate

Phase II

Prototype Development
24 months
~ \$750K – \$1.710M
~ 50% Success Rate

Phase III

Commercialization
No SBIR funding



> 5,000 new awards yearly

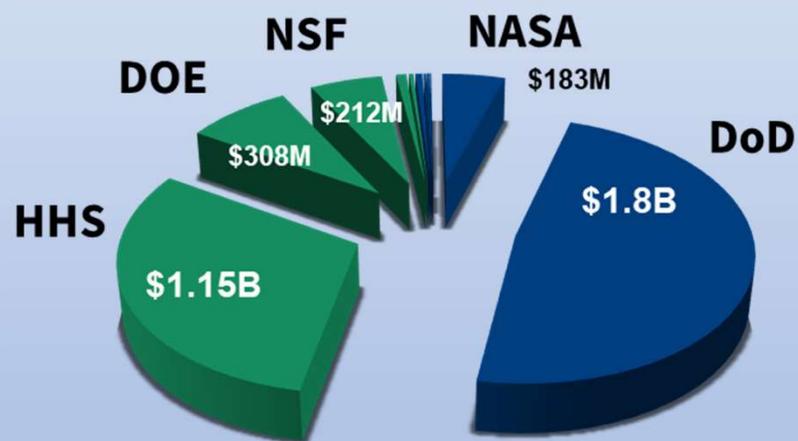
Differences: SBIR vs. STTR

	SBIR	STTR
Partnering Requirement	Permits partnering	Requires non-profit research institution partner
Principal Investigator	Primary employment (>50%) must be with the small business	PI may be employed by either research institution partner or small business (check solicitation)
Work Requirement	May subcontract up to: 33% (Phase I) 50% (Phase II)	Minimum: 40% Small Business 30% Research Institution Partner
Majority VC Ownership	Allowed by some agencies	Not allowed
Participating Agencies	11 agencies (extramural R&D budget > \$100M)	5 agencies (extramural R&D budget > \$1B)

Small business is both applicant & awardee

SBIR/STTR Agencies

SBIR	DoD	NASA	NSF	DoE	HHS	DoT	DoC	USDA	EPA	DHS	ED
STTR	DoD	NASA	NSF	DoE	HHS						



GFY 2019

SBIR: \$3.28 Billion
STTR: \$453 Million

Acquisition Differences

 Contracts	 Grants
<ul style="list-style-type: none"> ➤ Agency establishes plans, protocols, requirements ➤ Highly focused topics ➤ Procurement mechanism ➤ More fiscal requirements ➤ Invoiced on progress ➤ Binding agreement between buyer & seller for goods & services <p>DoD, DHS, NASA, EPA, DoT, ED</p>	<ul style="list-style-type: none"> ➤ Principal Investigator initiates approach ➤ Less-specified topics ➤ Assistance mechanism ➤ More flexibility ➤ Allows upfront payment ➤ Funds support public purpose, best efforts in research <p>NSF, DoE, USDA, NIST, NOAA</p>
Contracting <u>and</u> Granting: HHS (mostly grants)	

Look at each Agency's Proposal Instructions ' Different

Small Business Concern (SBC)

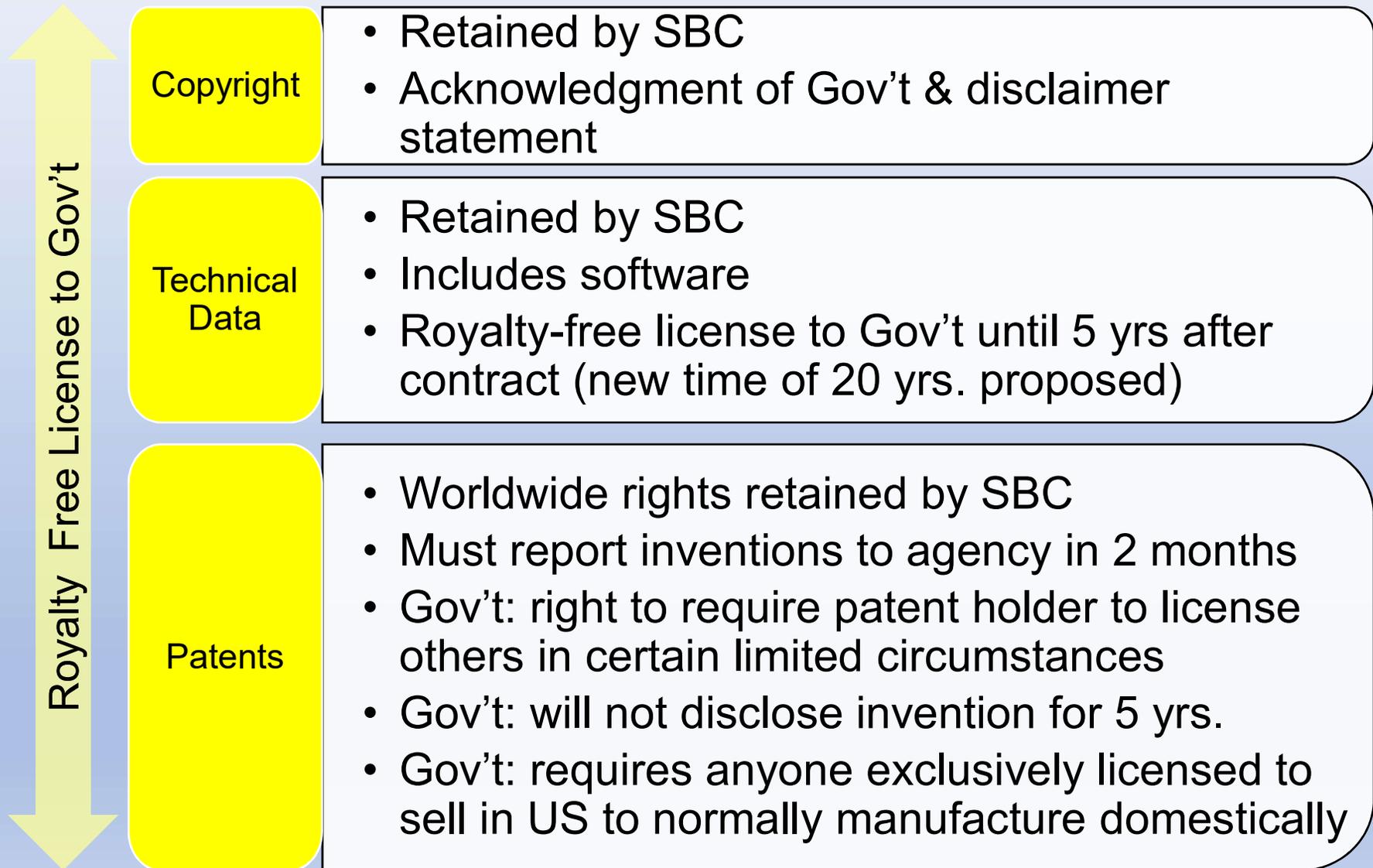
- Independently owned & operated for-profit; location + operation in USA 
 - Proprietorship, Partnership, LLC, Corporation, Joint Venture, Association, Trust, Cooperative
- 51% owned + controlled by one or more individuals who are citizens of, or permanent resident aliens in USA, *or*
- For-profit business concern at least 51% owned + controlled by another for-profit business concern at least 51% owned + controlled by one or more individuals who are citizens of, or permanent resident aliens in USA
- ≤ 500 employees including affiliates 
- Not dominant in field of business, with focus on R&D
 - No purchasing of equipment, or commercializing technology already developed, or tech with very low risk needing only capital

Principal Advantages to Program

GOV'T FUNDS PROJECTS, NOT COMPANIES!

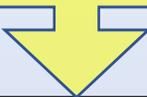
- You don't pay back SBIR money if you fail
 - Not a loan
 - No equity taken
 - Weighted Average Cost of Capital = 0
- If Gov't wants your product, Phase III awarded without competition
- Gov't protects Intellectual Property 4-5 yrs. after award completion (final report, final payment, closeout)

IP Rights Favorable



Get Ahead of Solicitations

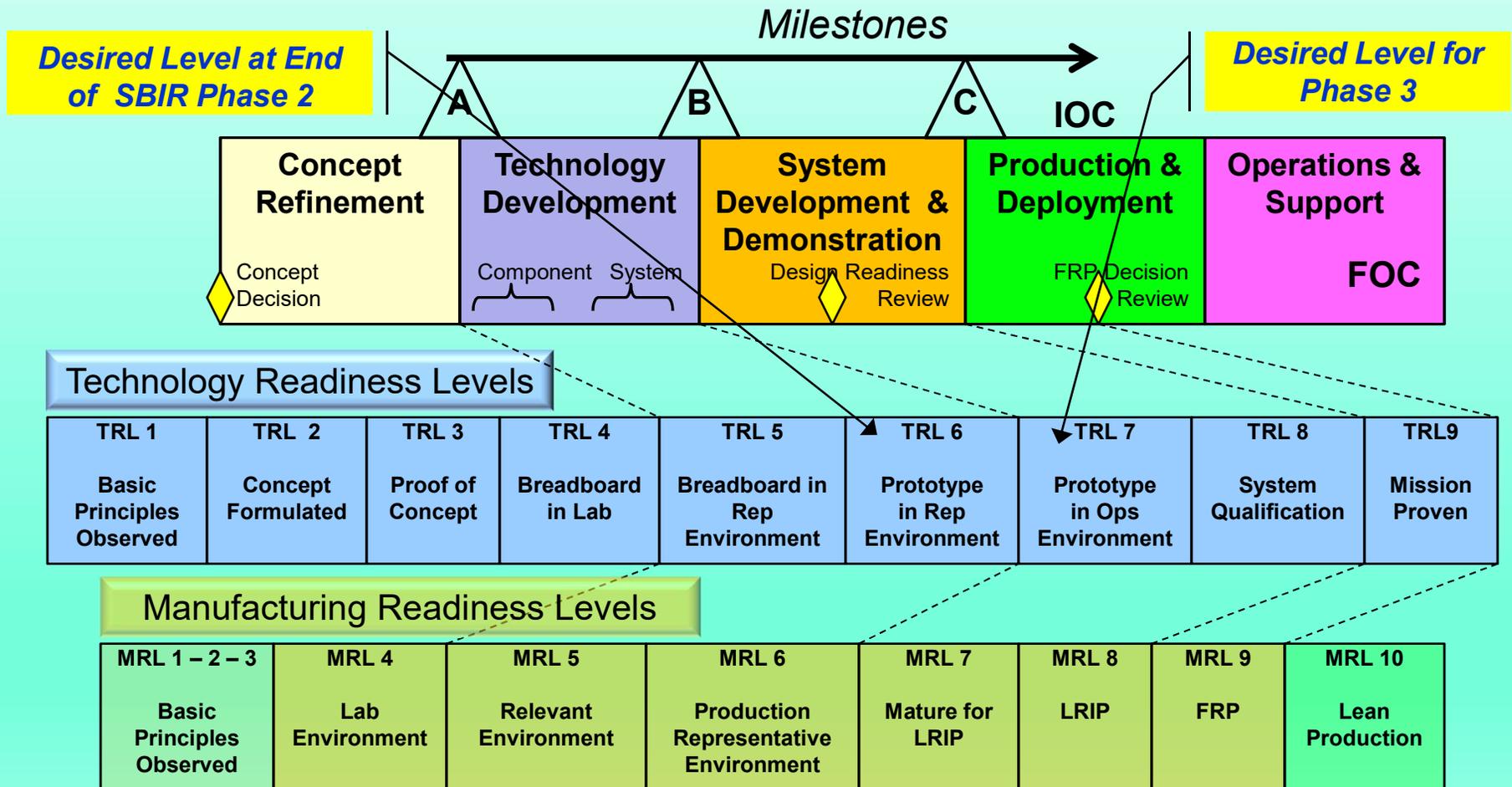
Responsibilities of SBC Founders



1. Form Legal Entity
2. Obtain DUNS #
3. Create & use appropriate financial records
4. Marketing
5. Know ITAR (Int'l Traffic in Arms) positions
6. Know of CMMC (Cybersecurity Maturity Model Certification)
7. CFIUS (Committee on Foreign Investment in U.S.)
8. Classify status of technology

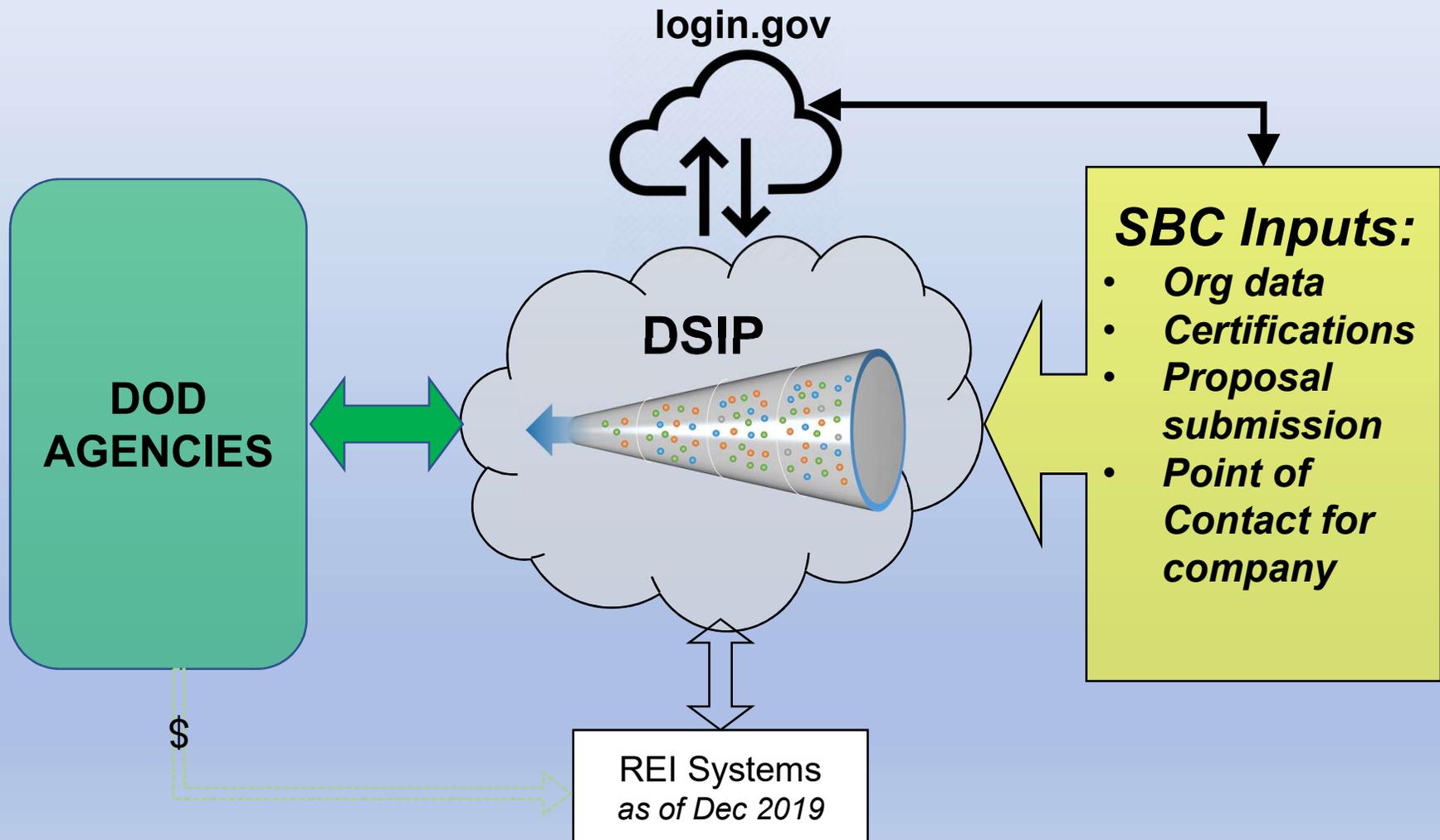
1. LLC or Corporation
 - LLC if Founders perform most work
 - Corp. if employees used
 - CA State OK to start; outside investors prefer DE State
2. Dun & Bradstreet number required for Gov't work
3. Gov't Contracts use Cost Accounting Std. (CAS)
 - Cash vs. Accrual bookkeeping
 - DOD uses Defense Contract Audit Agency for **AUDITS**
 - Use proper Chart of Accounts
4. Know Gov't customer, competition, commercial markets, market timing
5. Current exporting of product rules
6. Be aware of current Cyber Security regulations
7. Identify potential Foreign Investments, Employees, Contractors
8. Technology Readiness Level (TRL) & Manufacturing Readiness Level (MRL)

TRL & MRL in DoD Acquisition Process



Defense SBIR/STTR Innovation Portal (DSIP)

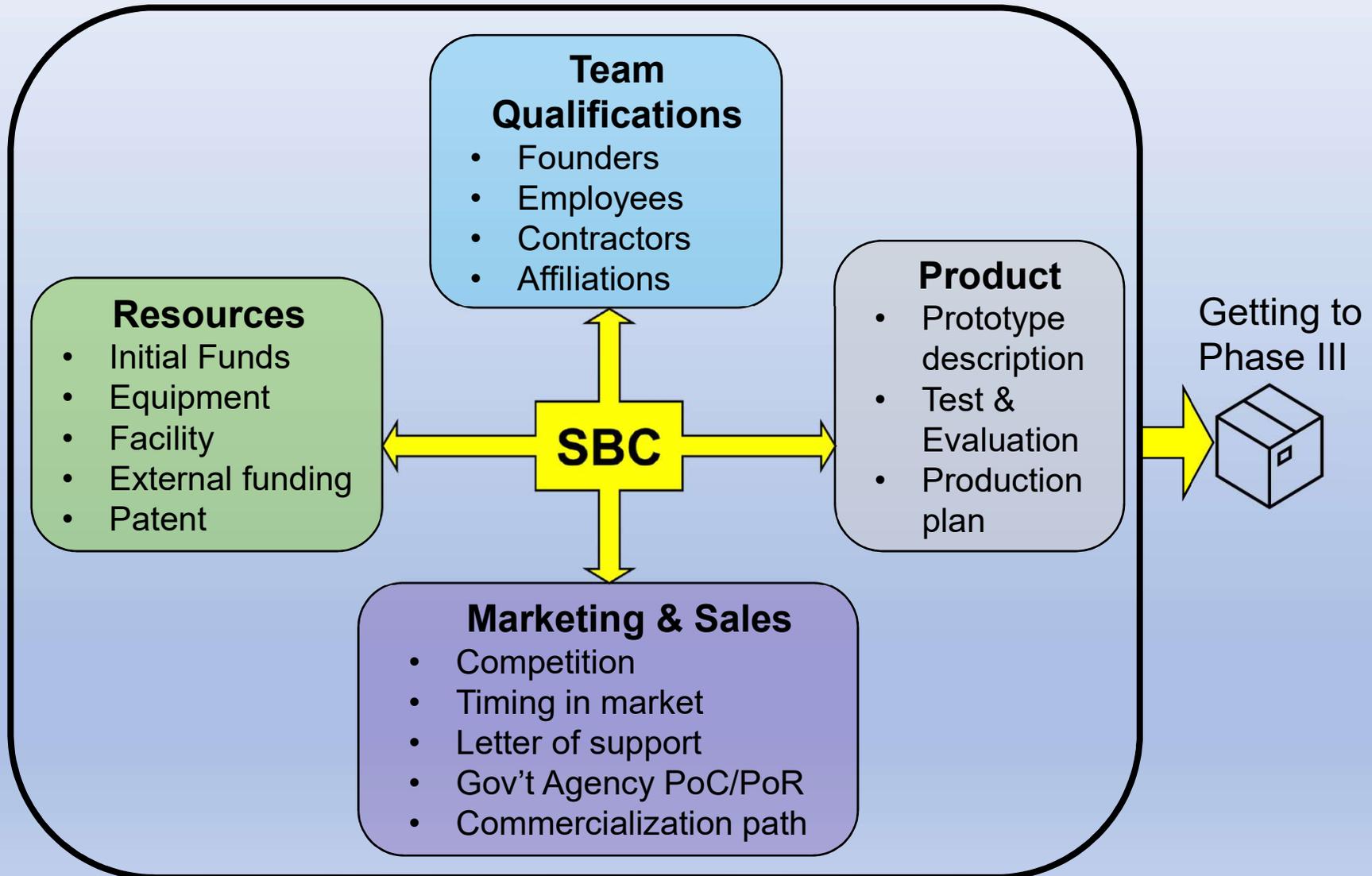
Secured 2 Factor Entryway for Inputs



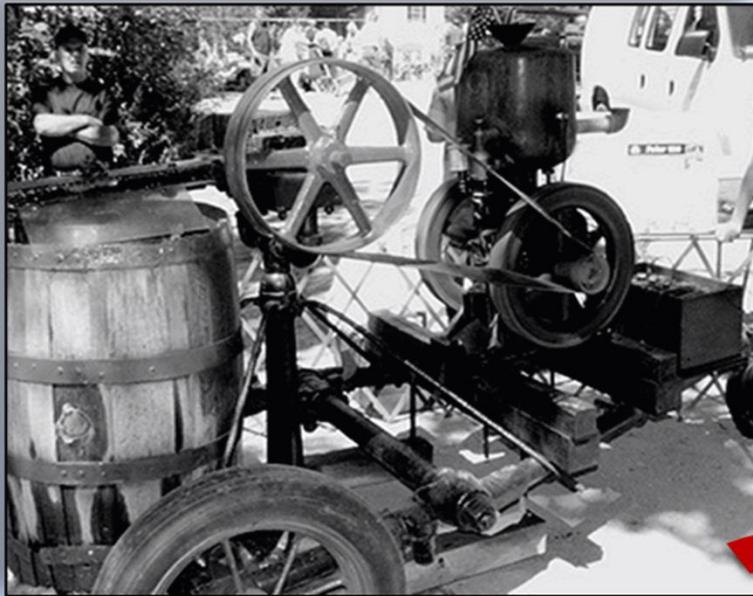
SBIR Products for DoD

Commodity Item: Commercial Off the Shelf (COTS)	✗
Non-Developmental Item (NDI)	✗
Basic Research	UNFAVORABLE
Developmental Item TRL >3 but < 6	✓
Commercial Prototype, in Production, or Fully Developed but not in Production Item modified to meet DoD requirements MRL < 6	✓ FAVORABLE

Some Clues for the Proposal



Phase III = Commercialization



SBIR OUTPUT

B2B: Business to
Business

B2G: Business
to Government



**MOST
LIKELY**

Gov't Definition of Commercialization

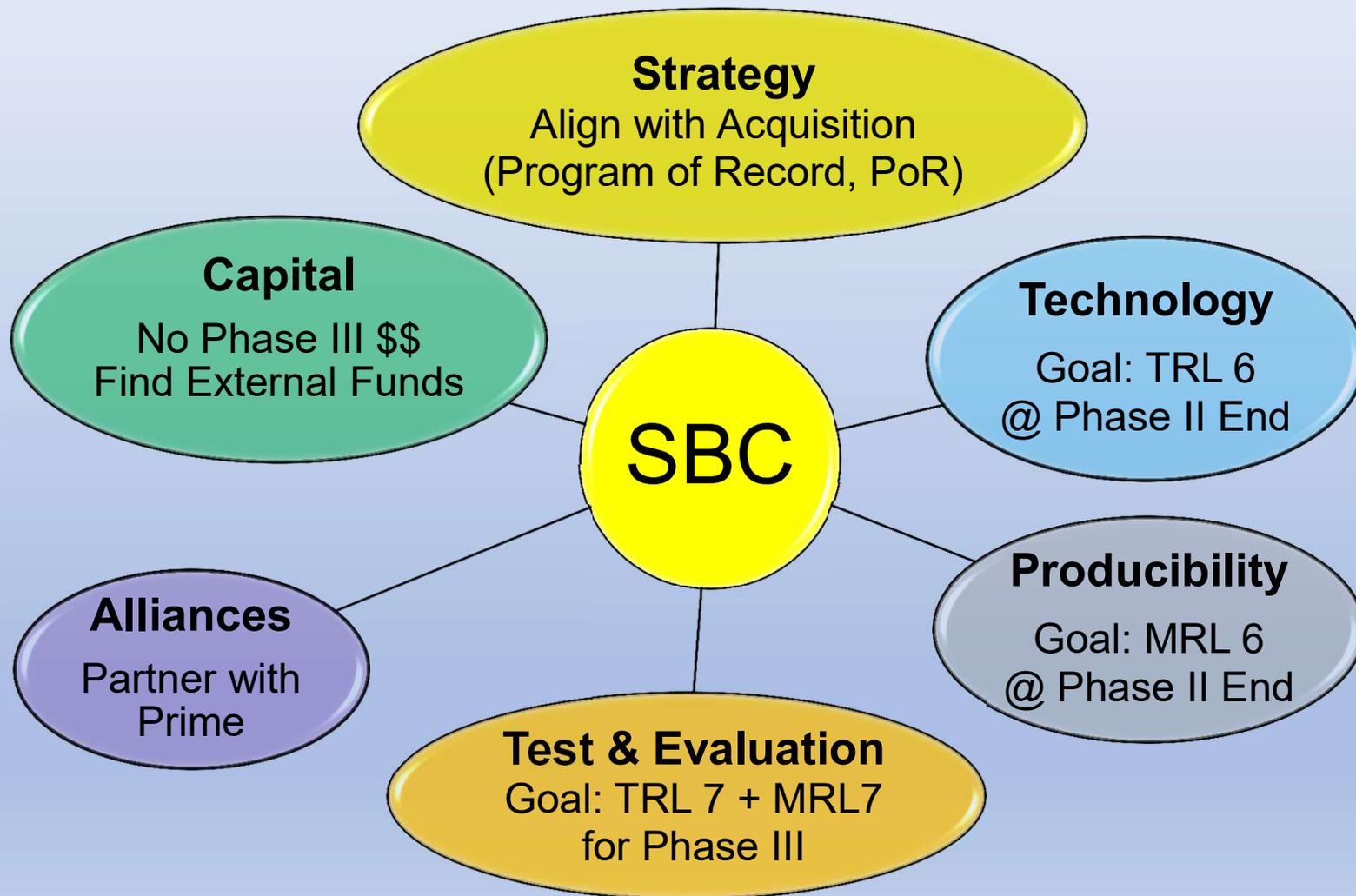
➤ Commercialization:

- Process of developing products, processes, technologies, or services; *and*
- Production & delivery (by originating party or by others) of products, processes, technologies, or services for **sale to or use by Federal Government or commercial market**

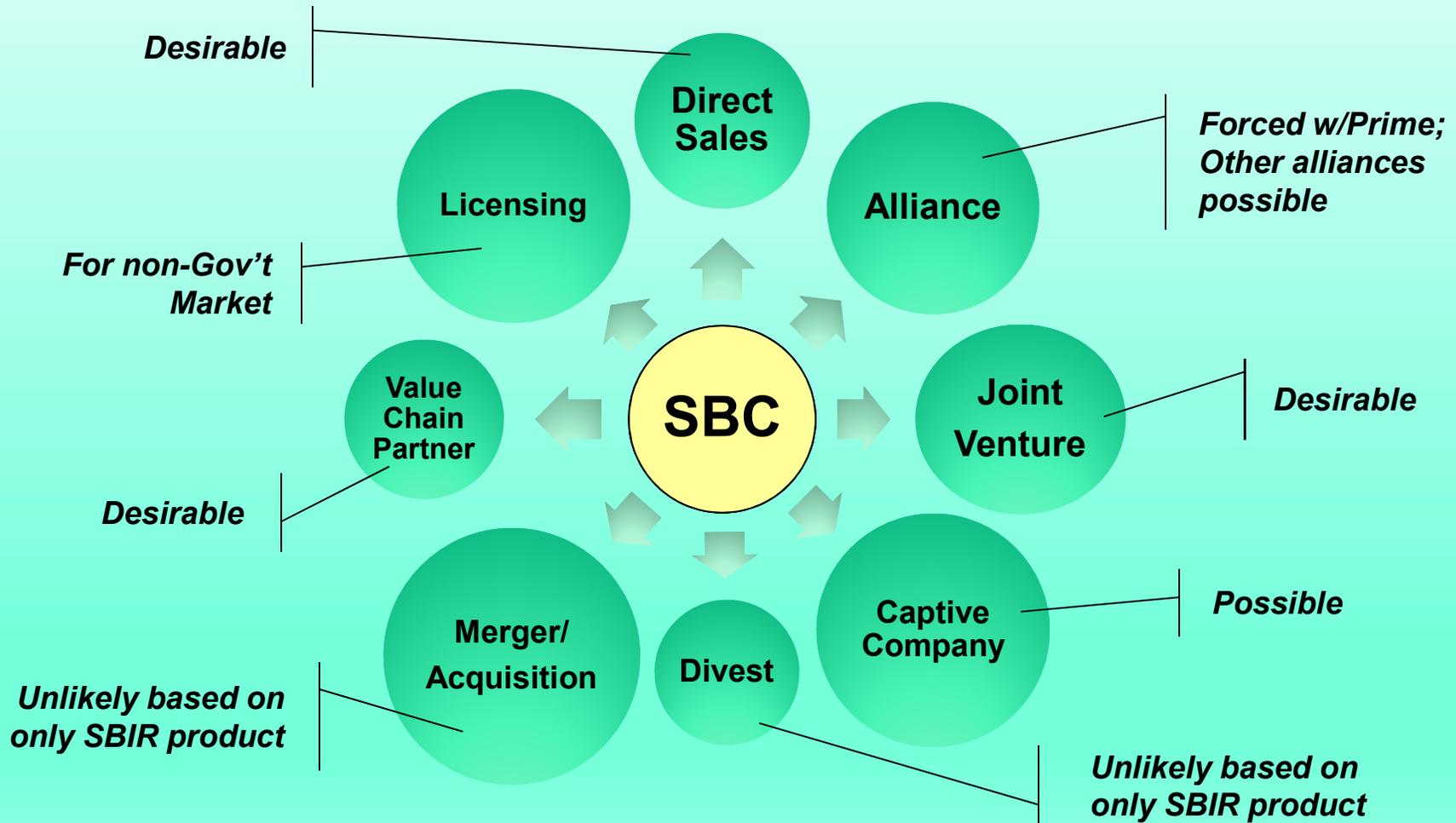
Agreed, but Note:
No definition of "Success"
Useful metric: Return on Investment

B2G Phase III Goals

Align with Program



B2B Phase III Options



OTHER DEALS

Other Transaction Authority (OTA)

Pitch Fests

Other Other

OTA for Prototype

- OTA**
- Not a Contract, Grant, or Cooperative Agreement
 - No hard & fast rules—up to acquisition authority
 - Diverse entities may participate, including **Consortium**
 - Teaming encouraged
 - No mandatory clause flowdown for subcontractor

PROTOTYPE	NO FED REGs	AWARD	FOLLOW ON
<ul style="list-style-type: none"> • Real • Virtual • Lowest possible quantity for proof • No Low Rate Initial Production 	<ul style="list-style-type: none"> • FAR • DFAR • DCAA 	<ul style="list-style-type: none"> • Usually FFP Award, not contract, <i>but</i> • Flexible & Negotiable • Milestone Payments • Profit Allowed • Negotiable IP & Data Rights • Secondary OTA possible 	<ul style="list-style-type: none"> • If prototype viable, <i>may</i> award specific direct contract for production outside of award without competition • May be structured like an OT, may/may not be FAR based



Entities Eligible for Award via OTA

➤ Non-Traditional Defense Contractor (NTC)

- Entity not currently performing & has not performed, for at least 1 yr. period preceding solicitation, any contract or subcontract for DoD subject to full coverage under Cost Accounting Standards
- Usually means Small Business; non-profit eligible

➤ Traditional defense contractor

But at least 1 NTC participates to “significant” extent by:

- Supplying new key technology or product
- Accomplishing significant amount of effort
- Causing material reduction in cost, schedule
- Causing an increase in performance

➤ An Entity (usually Traditional Defense Contractor) providing cash or in-kind cost share

- Typically 1/3 cost share including:
- New IR&D funds, profit from other contract, OH, capital equipment expense pool

Acquisition Exec can determine exceptional circumstances **justifies use of OTA** for executing innovative business models/structures not feasible or appropriate with FAR-based contract

Pitch Fests

- Organized by Gov't Agency, especially Air Force & Space Force at present
 - Usually uses independent outside org to manage event
 - Agency screens tech, notifies SBCs to attend at predetermined location; awards \$\$ immediately to winners
 - SBC usually goes through regular SBIR submission for basic screening as Agencies use SBIR monies
- Uses “Transition Partners” to vet companies, possibly provide outside funding



- Angels
- Private Investors
- Corporate Venture Capital
- Incubator/Accelerator



Be Wary of these Partners
*SBC needs to determine
if it wants Transition
Partner at this point in
time*

Other: Fed Lab & Fed Funded R&D Center (FFRDC) Tech Transfer

- Cooperative R&D Agreement (CRADA)
- Facility Usage Agreement
- Tech License
- Memorandum of Understanding
- Consulting Services – to/from, by contract
- Other Misc. Agreements:
 - Clinical Trials
 - Education Partnership
 - Material Transfer
 - Other Other



Usually no Gov't funding provided
SBC expected to commit funds to Gov't

When in Doubt Refer to this Source



Answer
Out

\$\$ In

Contact Info

Help available from:
Dennis Wonica, Ph. D.
LaserLight Networks, Inc.

dwonica@laserlightnetworks.com



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Questions?

Raffle winners, contact Brett Cornick at
brettcornick@gmail.com to claim your
Amazon gift card!