



Hacking for Defense™

Solving National Security Issues with the Lean LaunchPad™

The Educators Guide

Steve Blank, Joe Felter, Pete Newell

Preface

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Author Bios



Steve Blank: is an entrepreneur, consulting associate professor of innovation at Stanford, co-author of the bestselling, “Four Steps to the Epiphany” and “The Startup Owner’s Manual” and is one of Silicon Valley’s most important thought leaders. He created the methodology popularized by his student Eric Ries, author of *The Lean Startup*. In recent years he has developed and taught innovation methods that are being used widely by the Department of Defense, The National Science Foundation, and The Department of Energy. Steve’s career has taken him from repairing fighter planes in Thailand during the Vietnam War, to spook stuff in undisclosed location(s). He was lucky enough to arrive at the beginning of the boom times of Silicon Valley in 1978, and was part of 8 technology companies in the next 21 years, including a military intelligence systems supplier.



Dr. Joseph Felter holds senior research and teaching appointments at Stanford’s Center for International Security and Cooperation (CISAC), Hoover Institution, and Management Science & Engineering Department. Joe retired from the US Army in 2012 as a Colonel following a career as a Special Forces officer with service in a variety of special operations and diplomatic assignments including deployments to Panama, Philippines, Afghanistan and Iraq. Prior to arriving at Stanford, he led the International Security and Assistance Force, Counterinsurgency Advisory and Assistance Team (CAAT) in Afghanistan reporting directly to Gen. Stanley McChrystal and Gen. David Petraeus and advising them on counterinsurgency strategy. He has published widely on the topics of counterinsurgency, counterterrorism, and stabilizing conflict areas. Joe is coauthor of “*Small Wars, Big Data: How the Empirical Revolution Can Help Fight and Win Today’s Conflicts*” forthcoming (2017) at Princeton Univ. Press. He served as Director of West Point’s Combating Terrorism Center, where he was also a member of the Army Science Board, testified before the US Senate and House of Representatives and appeared regularly on major news networks discussing terrorism, insurgency and national security issues. Joe is a graduate of the United States Military Academy at West Point, holds a master’s degree from Harvard Kennedy School of Government and Ph.D. from Stanford.



Pete Newell was awarded the Silver Star Medal (America’s third-highest military combat decoration), for leading a U.S. Army battalion into the Battle of Fallujah, where he survived an ambush and left the protection of his armored vehicle in an attempt to save a mortally wounded officer. From 2010 to 2013 Pete led the US Army Rapid Equipping Force (REF) in the investment of over \$1.4B in developing solutions to answer Soldiers’ most pressing needs. Defense News Media named him to their list of the top 100 most influential people in the defense industry in 2012. Among the initiatives he developed were the Army’s \$66M

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effort to develop and deploy renewable energy systems on the battlefield and the Army's \$45M effort to design an integrated system to gather the data required to determine the potential causes of Traumatic Brain Injury on the battlefield. He was also responsible for the Army's first deployment of mobile advanced/additive manufacturing labs in a bid to more closely connect scientists and engineers to problems on the battlefield. Peter's experiences with REF are also the subject of case studies used in the classrooms at both the Stanford Graduate School of Business and the Massachusetts Institute of Technology Sloan School. He is now the managing partner at BMNT Partners, a company that brings together innovators working at the intersection of business, government, academia and society. He also serves as a Senior Visiting Fellow at the National Defense University.

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The goal of this document is to share *why* we created the *Hacking for Defense* (H4D) class and the practice of how we have run it. Think of this document as an annotated guide to how we built and taught the class. As educators, we expect you will adapt the class to your own school and curriculum as appropriate. As sponsors, we hope this gives you insight on what the teams are trying to accomplish and how they can deliver value to you and your organization.

History

In 2010, at the height of the surge in US Forces in Afghanistan the Taliban changed tactics and instead of attacking large vehicle convoys with Improvised Explosive Devices (IEDs), they began to target the dismounted troops that had begun to flood the country. The frequency of these attacks rapidly climbed from a low of 5 a month in April 2010 when US Forces first started to the surge to a peak of more than 800 a month by November of the same year. With very little means of finding buried IED's or the pressure plate triggers that set them off, dismounted patrols could do little to protect themselves. The resulting casualties were horrific.

Between April and November 2010 the Department of Defense was in the middle of a \$1.5B effort to provide better armor protection and IED detecting capabilities to vehicle convoys traveling the roadways in Afghanistan and Iraq. Defeating IED attacks against dismounted patrols was not on the Afghanistan Theater or CENTCOM Commander's priority lists. Even the rapid acquisition programs like the US Army Rapid Equipping Force (REF) and the Joint IED Defeat Organization (JIEDDO) had missed the rapid change on the battlefield as they had become focused on delivering products to the warfighter vice searching for new problems to solve.

In late 2010 the REF, then JIEDDO identified the change and within six month began to deliver equipment designed to defeat the dismounted IED threat. Even though six months is an exceptionally short time by procurement standards, in that same six months the US would suffer almost 4,000 casualties from IED attacks against dismounted patrols. In a bit of soul searching, REF leadership underwent a major review of how the REF found and acquired problems to solve. The revised vision that grew out of that review would lead the REF to restructure itself to focus on finding problems, not just providing products A new vision statement for the REF reflected clarified this change of focus in five simple bullets:

- *Be present*: Maintain forward presence at the tactical edge of operations. Close the gap between the Soldier and the scientist
- *Be predictive*: Find emerging problems. Provide Senior Army Leaders "peripheral vision"
- *Be intuitive*: Organize to quickly gain an understanding of a problem and the environment it exists in
- *Be inclusive*: Form partnerships and look for multiple paths to solve problems. Help other Army organizations and industry see, understand and attack emerging gaps
- *Be aggressive*: Push the acquisition envelope, but operate within the law. Negotiate

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solutions with the users - At REF the speed of delivery will be slightly more important than effectiveness and cost. Use iterative development to improve effectiveness and reduce cost

This new vision at REF led to the adoption of a new more aggressive problem sourcing strategy and a wholesale change in their effectiveness in finding problems and building teams to attack and solve them. By the middle of 2013, REF had used this approach to attract and execute more than \$1.4B in support of their problem solving efforts.

Two years later serendipity struck and brought us together. In March 2015 Pete and Joe led the design and execution of the first “Hacking for Defense” initiative at Stanford University’s Center for International Security and Cooperation (CISAC). Stanford graduate students with military backgrounds were recruited to participate in an intensive problem solving exercise aimed at identifying technology informed solutions to a number of discrete problems facing the DoD. This initiative was part of a broader DoD effort to more effectively identify and access defense relevant technologies across the global marketplace and connect and scale defense innovation efforts. The National Security Technology Accelerator (NSTXL) based at the National Defense University provided support for the “Hacking for Defense” pilot at Stanford.

After the weeklong exercise, Pete, Joe and the Team Leads for the individual problems outbriefed former Secretary of Defense William Perry, Director of the Stanford-Harvard Preventive Defense Project, on the results. Secretary Perry was impressed with the accomplishments of the Stanford graduate student teams had made towards addressing these critical DoD challenges and encouraged us to consider developing Hacking for Defense as an academic class and get more students involved in helping to solve DoD problems. Joe and Pete took this for action and endeavored to determine how best to transform this problem solving initiative in support of DoD into an academic curriculum consistent with Secretary Perry’s vision.

Fortuitously, one of the exercise’s participants, a Graduate School of Business student and former special forces operator, was also enrolled in Steve’s extraordinarily popular Lean Launch Pad class. Towards the end of that spring quarter he suggested to Steve that he meet with Pete and Joe and their team to learn more about their nascent efforts and plans for Hacking for Defense. As a military veteran and citizen concerned about providing for our national defense, Steve’s curiosity was piqued and he agreed to make time in his busy schedule to meet. In a planned 20-minute meeting the conversation in front of a dry-erase board stretched for nearly 3 hours. We realized that the problem curation methods that Pete had built at the REF between 2010 and 2013 and Pete/Joe’s 2013-2015 efforts to recruit Silicon Valley talent to help solve emerging battlefield problems, used virtually the same methods that Steve had been teaching start-ups in his Lean LaunchPad class to do for the past 10 years. On the spot, Steve committed to helping create and teach a course that utilized the “Lean” methodology he had developed and proven so successful in empowering his students to build viable commercial companies and tailoring it to help students address critical problems facing the DoD and other government agencies.

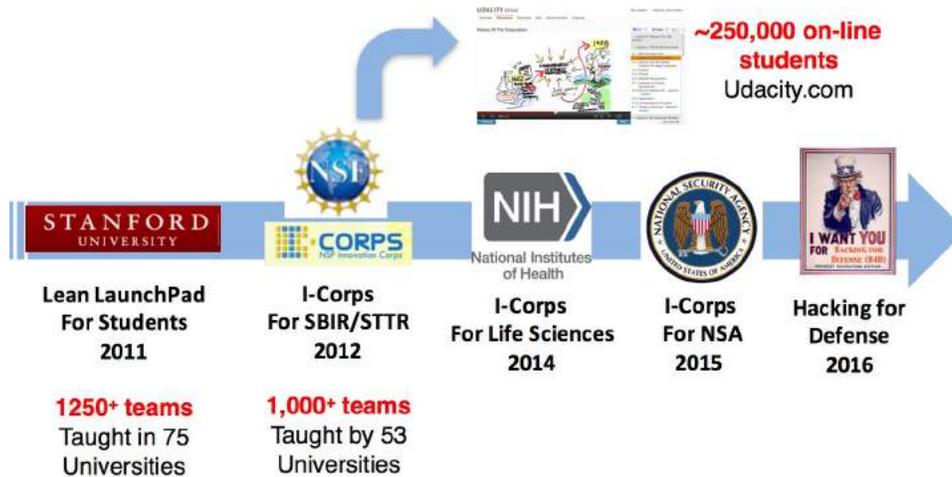
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The genesis of this class is the result of Secretary Perry’s initial mandate at Stanford, Steve Blank’s subsequent intervention and our whole-hearted commitment to harness our experience and the untapped potential of America’s brightest university students to help make the world a safer place.

Scope

Hacking for Defense (H4D) gives students hands-on experience in understanding, and working with the Defense (DOD) and Intelligence Community (IC) on actual problems they currently confront. Students learn how to innovate at speed and learn how to deploy solutions using Lean Methods solving national security problems.

The class combines that same rapid problem sourcing process developed on the battlefields in Afghanistan with the [Lean LaunchPad Methodology](#) for rapid customer learning and product development, first taught at Stanford as the *Lean LaunchPad* course.



Relabeled as the “National Science Foundation *Innovation Corps*” or “*I-Corps*”, the class has been adopted by the National Science Foundation, National Institute of Health, Department of Energy National Geospatial Intelligence Agency (NGA) and the National Security Agency (NSA). The class teaches scientists, researchers and engineers how to commercialize their technologies. To date, over 1,000 teams have been taught by 70 instructors in 50 universities and government agencies.

We intend to achieve similar results and impact with for this *Hacking for Defense* class. Our goal is to rapidly disseminate the syllabus to other colleges and universities to help create a 21st century “Tech ROTC.”

Focus

The focus of the Hacking for Defense class has been on solving Department of Defense and Intelligence Community problems; however, initial indications are that the approach is generalizable and can embrace the challenges faced by a range of organizations that measure their success not in terms of revenue and profit, like most private sector companies, but rather by mission achievement and creating public value for their constituents. These include, for example, the State Department for diplomacy and policy problems, local and regional governments addressing a diverse array of public sector challenges and many others that can succulently frame problems and provide students access to beneficiaries and stakeholders.

Acknowledgements

Hacking for Defense was first taught at Stanford University's Management Science & Engineering Department. Hats off to Professor Tom Byers, who gave us the freedom to invent and teach the class. The class would not have been possible without the early inspiration and sponsorship of Dr. William Perry the 19th Secretary of Defense and the instructors who volunteered their time to teach the Stanford class: Tom Byers, Joe Felter and Steve Blank at Stanford, Pete Newell and Jackie Space of BMNT Partners, and Kim Chang, Konstantine Buhler, Ben Kohlmann, John Deniston, Chris DiOrio were our Teaching Assistants.



We received great support from the National Defense University, the Department of Energy Advanced Manufacturing Office, as well as the Defense Innovation Unit Experimental. Thanks also to our team of mentors and military liaisons. And finally to our sponsors in the Department of Defense and Intelligence community who worked closely with our student teams and were patient as we built the first MVP of this class.

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Why Hacking for Defense?

The Problem

Army, Navy, Air Force, Marines, CIA, NSA. What do all these groups in the Department of Defense and Intelligence Community (DOD/IC) have in common? Up until the dawn of the 21st century, they defined military technology superiority. Our defense and intelligence community owned and/or could buy and deploy the most advanced technology in the world. Their R&D groups and contractors had the smartest domain experts who could design and manufacture the best systems. Not only were they insulated from technological disruption, they were often also the disrupters. (During the Cold War we used asymmetric technologies in silicon and software to disrupt the Soviet Union’s lead in conventional weapons.) Yet in the last decade the U.S. Department of Defense and Intelligence Community are now facing their own disruption from ISIS, al-Qaeda North Korea, Crime. Ukraine, DF-21 and Islands in the South China Sea.

Today these potential adversaries are able to harness the power of social networks, encryption, GPS, low-cost drones, 3D printers, simpler design and manufacturing processes, agile and lean methodologies, ubiquitous Internet and smartphones. Our once closely held expertise in people, processes and systems that we once had has evolved to become commercial off-the-shelf technologies. U.S. agencies that historically owned technology superiority and fielded cutting-edge technologies now find that off-the-shelf solutions may be more advanced than the solutions they are working on, or that adversaries can rapidly create asymmetric responses using these readily available technologies.

It’s Not *Just* the Technology Perhaps more important than the technologies, these new adversaries *can acquire and deploy disruptive technology at a speed* that to us looks like a blur. They can do so because most have little legacy organizational baggage, no government overhead, some of the best software talent in the world, cheap manpower costs, no career risk when attempting new unproven feats and ultimately no fear of failure.

<i>Organizational Capabilities</i>	
Dept of Defense/Intel Community	Insurgents
Key Performance Indicators	Effectiveness in the Field
Command & Control Hierarchy	Networked/Decentralized Organization
Outsourced to contractors	Owned by internal/integrated teams
Efficient project management	Lean/Agile, iterative & incremental deployment
Large Projects	Small Projects
Decade-long Projects	Rapid Time to Fielding
Fear of Failure	Risk/failure as part of the process

Terrorists today live on the ‘net and they are all early adopters. They don’t need an office in Silicon Valley to figure out what’s out there. They are experts in leveraging Web 2.0 and they are able to collaborate using Telegram, Instagram, Facebook, Skype, FaceTime, YouTube, wiki’s, IM/chat. Targeting, assessments, technology, recipes, and tactics all flow at the speed

of a Lean Startup. They can crowd-source designs, find components through eBay, fund through PayPal, train using virtual worlds and refine tactics, techniques and procedures using massive on-line gaming. All while we're still writing a Request for a Proposal from within the US Government procurement and acquisition channels.

<i>Technology Capabilities</i>	
Dept of Defense/Intel Community	Insurgents
Domain Experts	Crowd-source knowledge
Proprietary Technology	Open Source Tech
Zero Defects	Good enough to use now
Elegant/Complex solutions	Asymmetric Weapons/Strategies

In contrast to the agility of many of our adversaries, the Department of Defense and the Intelligence Community have huge investments in existing systems (aircraft carriers, manned fighters and bombers, large satellites, etc.), an incentive system (promotions) that supports the status quo, an existing contractor base with major political influence over procurement and acquisition, and the talent to deliver complex systems that are the answer to past problems.

Efficiently Being Inefficient Our drive for ultimate efficiency in buying military systems (procurement) has made us our own worst enemy. These acquisition and procurement “silos” of excellence are virtually impenetrable by new ideas and requirements. Even in the rare moments of crisis and need, when they do show some flexibility, their reaction is often so slow and cumbersome that by the time the solutions reach the field, the problem they intended to solve has changed so dramatically the solutions are useless.

Defense-relevant technologies increasingly originate in the commercial technology base, underscoring the urgent requirement for the Department of Defense (DoD) to establish more proactive and responsive mechanisms that identify and exploit these “dual-use” technology opportunities. [Sharpening America’s technological edge](#) and maintaining its superiority requires adopting and integrating commercial technology into defense systems more rapidly and efficiently than our opponents with access to similar technologies. Defense research and development (R&D) and acquisition processes must adapt to this emerging technological landscape and better harness available sources of innovation potential.

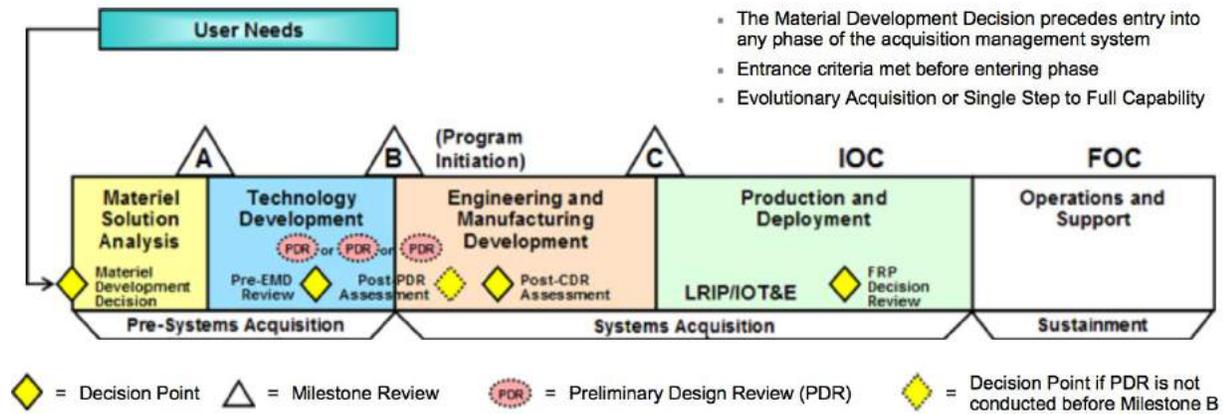
However, incentives for bringing this needed innovation into the government with speed and urgency are not currently aligned with the government acquisition, budgeting, and requirements processes all of which have remained unchanged for decades or even centuries. While new threats appear in months or even weeks, the DOD and IC Community acquisition processes are still measured in years.

Agencies that historically owned technology superiority and fielded cutting-edge technologies are now finding that commercial solutions may be more advanced, or that adversaries can create asymmetric responses by the time our solutions are deployed.

As a result, the DOD fails to acquire truly innovative technologies (much less paradigm-changing technologies) in a timely fashion.

While [DARPA](#) and [In-Q-Tel](#) try to fill the need for speed, they were designed for a threat environment that historically gave the DOD/IC years to respond. That's no longer true. We no longer have this kind of time. Our enemies have access to readily available dual-use technologies and will employ them against our interests at home and abroad. Our adversaries are rapidly creating asymmetric threats unconstrained by bureaucracy and

System Acquisition Framework



systemic friction – it is an urgent national security requirement for us to innovate even quicker.

Today the primary conduits for bringing new technology to the government are still the large and established defense prime contractors (e.g., Lockheed, Boeing, Raytheon, Leidos, Northrup Grumman, L3, General Dynamics, et al.) But most of these contractors focus on fulfilling *existing* technology needs that can be profitable.

Elements of the Department of Defense and Intelligence Community understand the danger of this lag time and are experimenting with alternatives to the traditional acquisition process. (The Army's [Rapid Equipping Force](#) was a war-time example of one such successful program.) The Department of Defense has set up an [innovation outpost in Silicon Valley](#), (but unfortunately they're currently thinking that it's Silicon Valley technology they should adopt, not its speed or agility.) Some agencies are writing [90-day contracts for prototypes](#), others are starting their own incubators or running internal Hackathons, or creating outposts in Silicon Valley. Some agencies have already adopted the Lean LaunchPad/I-Corps curriculum to foster rapid prototype development skills among their staffs.

The Solution

Hacking for Defense (H4D) is designed to provide students the opportunity to learn how to work with the Department of Defense (DoD) and Intelligence Community (IC) to better address the nation's emerging threats and security challenges. We teach student *not how to build demos* for generals but to understand how to *deploy* solutions to warfighters- with the speed and urgency required to compete in the modern threat environment.

This national network of classes will provide a university-based ecosystem that can develop prototypes that match DOD/IC users' needs in months rather than years. Further, by creating a national network of colleges and universities, the *Hacking for Defense* program can scale to provide hundreds of solutions a year. In doing so the universities will also develop the future workforce that our country so desperately needs to allow us to counter threats at the same speed that they are generated by our adversaries.

Agencies or Commands in the Department of Defense and Intelligence Community may provide follow-on funding to these student teams for further refinement and development of prototypes.

In the existing Lean LaunchPad and I-Corps classes, student teams come to class with a vision of a product or service they'd like to build. In this *Hacking for Defense* (H4D) class, student teams may either *select from an existing set of problems* provided by the DoD/IC community or introduce their own ideas for DoD/IC problems that need to be solved.

Although teams pick a problem to solve, *Hacking for Defense* is not a product incubator for a specific technology solution. Instead, it provides teams with a deeper understanding of selected problems and the host of potential technological solutions that might be arrayed against them. Using the [Lean LaunchPad Methodology](#) the class focuses teams to:

1. Profoundly understand the problems/needs of government beneficiaries
2. Rapidly iterate technology solutions while searching for product-market fit
3. Understand all the stakeholders, deployment issues, costs, resources, and ultimate mission value
4. Deliver minimum viable products that match beneficiary needs in an extremely short time
5. Produce a repeatable model that can be used to launch other potential technology solutions

How Does This Class Work?

Hacking for Defense uses the same teaching methodology proven successful in Lean LaunchPad and I-Corps classes taught at universities across the country. The difference in this class is that instead of teams working on their own ideas for a company, they address critical problems facing the Department of Defense and the Intelligence Community. (These problems are selected from among a range proposed by sponsors from across the DOD/Intel Community and curated by a non-profit central clearinghouse - HD4i.org.

Each week the student teams (typically 4) get out of the classroom and interview at least 10 “beneficiaries”- military/government end users and stakeholders to deeply understand the sponsor’s problems and to develop a set of initial hypotheses about the solution to their problem. Returning to class the teams give a weekly 8-minute presentation about what they learned, and demo their latest minimal viable prototypes. They get feedback from the instructors, mentors and their classmates. Each team documents the details of their beneficiary discovery interviews on their blog. This enables teams, instructors and mentors to have immediate access to the progress of each team.

Over the weeks of the class, guided by a Mission Model Canvas, the teams learn more, they validate, invalidate or modify hypotheses through beneficiary discovery and build minimal viable prototypes (MVPs).

Each team is guided by two mentors, one from the sponsoring agency that proposed the problem and a second from the local community. Where possible, students are also assisted by a military/intelligence liaison with experience working in the DoD/IC. By the end of the class the students will understand what it takes to *deploy a needed solution rapidly*.

The collaboration between students and sponsors is valuable to the DOD and IC, and may be as important as the solutions derived by the students. Sponsors get to see first-hand the power of the Lean Methodology and how it can quickly develop solutions that are needed and wanted and can be deployed at speed.

How Is This Document Organized?

This Educator Guide first describes the foundations of the problem solving approach used in the Hacking for Defense class and then provides a detailed primer on how to teach the class to include content, pedagogy and logistics. The Educator Guide is organized in the following sections:

1. Lean Start Up History and the Lean Launchpad Pedagogy
2. The Mission Model Canvas
3. Identifying the DoD/IC Problems for the class
4. Forming Student Teams of Solution Providers
5. Assembling the Teaching Team
6. Class Culture
7. Class Organization
8. The Class Roadmap
9. Teaching Team Roles and Tools
10. Detailed Class Curriculum

The Lean Startup Manifesto

For most of the 20th century, we've treated new ventures (inside and outside companies and government agencies) like they are just smaller versions of large companies. We did so because we lacked a language to differentiate between existing companies who *execute* a business/mission model, and new ventures that *search* for one. This distinction between *search* and *execution* is at the heart of the lean approach. It shapes the lean definition of a new venture: *a temporary organization designed to search for a repeatable and scalable business or mission model.*

Business Plans

Before the Lean Innovation Method started to take hold, conventional wisdom stated that the first thing a founder must do is create a business plan—a static document that with a series of implicit hypotheses describes the size of an opportunity, the problem to be solved, and the solution that the new venture will provide. Typically, it includes a five- year forecast for revenue, profits, and cash flow. Business plans assumed that to be successful a new venture need to document and things they would to *execute the business.*

Educators took the writing of a business plan as the document to teach in business schools. Educators found that teaching how to write business plans useful because: 1) they believed a plan provided a comprehensive way to help students envision all the resources needed to turn an idea into a salable product, 2) was a simple paradigm to teach, 3) they were what large companies were using to plan and deliver their follow-on products, and 4) were what venture capitalists or corporate finance required.

After decades of watching thousands of startups and internal company ventures follow this standard regimen, we've now learned at least three things about business plans:

1. *No business plan survives first contact with customers.* As the boxer Mike Tyson once said about his opponents' prefight strategies: "Everybody has a plan until they get punched in the mouth."
2. *Startups are not smaller versions of large companies.* They do not unfold in accordance with master plans. Those that ultimately succeed go quickly from failure to failure, all the while adapting, testing new iterations, and improving their initial ideas as they continually learn from customers.
3. No one, aside from venture capitalists and the former Soviet Union, requires five-year plans to forecast a series of unknowns.

A business plan is often a research exercise written in isolation at a desk before an entrepreneur has even begun to build a product. The implicit assumption is that it's possible to figure out most of the unknowns of a business in advance, before you raise money and actually execute the idea.

The problem with this process is that it builds a false sense of certainty, in an environment that is fundamentally uncertain. In this conventional model, once an entrepreneur with a convincing business plan obtains money from investors, he or she feels compelled to *execute*

the plan as presented. They start developing the product as originally spec'd and developers invest thousands of man-hours to prepare it for launch with little, if any, customer input. Only after the product is built and launched does the product get substantial feedback from customers—when the salesforce attempts to sell it. And too often, after months or even years of development, entrepreneurs learn the hard way that customers do not need or want most of the product's features.

Lean Innovation: Key Principles

As a formal method, the Lean Innovation consists of three parts:

- The Business/Mission Model Canvas – to frame hypotheses
- Customer/Beneficiary Development – to test those hypotheses in front of customers/beneficiaries
- Agile Engineering – to build Minimum Viable Products to maximize learning

First, rather than engaging in months of planning and research, entrepreneurs accept that all they have on day one is a series of untested hypotheses—basically, good guesses. The foundation of Lean Innovation is *evidence-based entrepreneurship*. Instead of creating an intricate business plan, founders in commercial firms summarize their hypotheses in a framework called a *Business Model Canvas*. (In the DOD and IC community we use a variant of the business model called the *Mission Model Canvas*. Described later in this section. We stick to the Business Model Canvas vernacular in this section for consistency in introducing Lean principles.) Essentially, this is a diagram of how all the things a new venture will need to do to create value for itself and its customers/beneficiaries.

Second, lean ventures are driven by the realization that “there are no facts inside the building, so get the heck outside.” This “get out of the building” approach is called *Customer Development* and is used to test hypotheses and collect evidence about whether they are true or false. They go out and ask potential users, purchasers, and partners for feedback on all elements of the business model, including product features, pricing, distribution channels, and affordable customer acquisition strategies. The emphasis is on nimbleness and speed; new ventures rapidly assemble minimum viable products (MVPs) and immediately elicit customer feedback. Then, using customers' input to revise their assumptions, lean startups start the cycle over again, testing redesigned offerings and making further small adjustments (iterations) or more substantive ones (pivots) to ideas that aren't working.

Third, lean ventures practice something called *Agile development*, which originated in the software industry. Agile development works hand-in-hand with Customer Development. Unlike typical year-long product development cycles that presuppose knowledge of customer/beneficiaries' problems and product needs, Agile development eliminates wasted time and resources by developing the product iteratively and incrementally. It's the process by which new ventures create the minimum viable products they test.

Strategy: Business/Mission Model to Operating Plan



The emphasis on *search* for a validated Business or Mission Model versus *execution* of a plan is at the heart of the Hacking for Defense curriculum.

When first starting a new venture, the business/mission model is *unknown*. It is a set of untested hypotheses. A teams' key task is to test hypotheses, *searching* to verify the mission model components; e.g., Beneficiaries, value proposition, product features, deployment, mission achievement, buy-in. Only once the mission model is *known*, then new ventures can create an operating plan to determine and communicate how the mission will be executed.

The term “business model” first appeared around 50 years ago, but the concept didn’t catch on until the 1990s. A business model describes how a company creates, delivers, and captures value. It became common to discuss business models, but without a standard framework and vernacular, confusion reigned. In 2010, when Alexander Osterwalder published his book, *Business Model Generation*, he provided a visual framework that was sorely needed, and it became obvious that the Business Model Canvas was *the* tool to organize new venture hypotheses in a more structured way.

Sketch Out Your Hypotheses

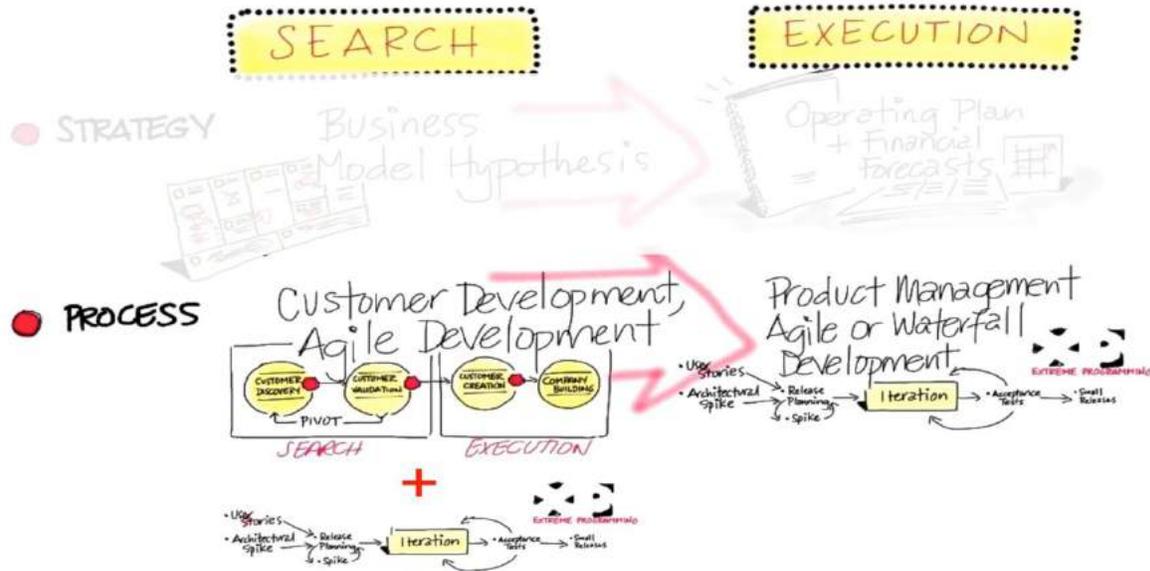
The business model canvas lets you look at all nine building blocks of your business on one page. Each component of the business model contains a series of hypotheses that you need to test.

KEY PARTNERS Who are our key partners? Who are our key suppliers? Which key resources are we acquiring from our partners? Which key activities do partners perform?	KEY ACTIVITIES What key activities do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?	VALUE PROPOSITIONS What value do we deliver to the customer? Which one of our customers' problems are we helping to solve? What bundles of products and services are we offering to each segment? Which customer needs are we satisfying? What is the minimum viable product?	CUSTOMER RELATIONSHIPS How do we get, keep, and grow customers? Which customer relationships have we established? How are they integrated with the rest of our business model? How costly are they?	CUSTOMER SEGMENTS For whom are we creating value? Who are our most important customers? What are the customer archetypes?
	KEY RESOURCES What key resources do our value propositions require? Our distribution channels? Customer relationships? Revenue streams?		CHANNELS Through which channels do our customer segments want to be reached? How do other companies reach them now? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?	
COST STRUCTURE What are the most important costs inherent to our business model? Which key resources are most expensive? Which key activities are most expensive?		REVENUE STREAMS For what value are our customers really willing to pay? For what do they currently pay? What is the revenue model? What are the pricing tactics?		

SOURCE WWW.BUSINESSMODELGENERATION.COM/CANVAS. CANVAS CONCEPT DEVELOPED BY ALEXANDER OSTERWALDER AND YVES PIGNEUR.

The primary objective of a new venture is to validate its business/mission model hypotheses until it finds one that is repeatable and scalable (it continues to iterate and pivot until it does or runs out of time/money). Then it moves into *execution* mode. It's at this point the startup needs a business plan, a document that articulates the model, market, competition, operating plan, financial requirements, forecasts, and other well-understood management tools.

Process: Customer and Agile Development to Product Management



Yet as powerful as the Business/Mission Model Canvas is, at the end of the day it is just a tool for identifying hypotheses without a formal way of testing them. The Lean LaunchPad approach extends this process into the real world by providing a set of tools for testing hypotheses and enhancing the venture through experimentation and iteration.

The *processes* used to organize and implement the search for the business model are a combination of [Customer Development](#) and *Agile development*. The search for a business model can occur in any new business—in a brand-new startup or in a new division of an existing company.

The Customer Development model breaks out all the customer-related activities of an early-stage company into four easy to understand steps. The first two steps outline the “search” for the business model. Steps three and four “execute” the business model that’s been developed, tested, and proven in steps one and two. The steps: Customer Discovery first captures the

Listen to Customers

During customer development, a start-up searches for a business model that works. If customer feedback reveals that its business hypotheses are wrong, it either revises them or “pivots” to new hypotheses. Once a model is proven, the start-up starts executing, building a formal organization. Each stage of customer development is iterative: A start-up will probably fail several times before finding the right approach.

SEARCH		EXECUTION	
1 CUSTOMER DISCOVERY	2 CUSTOMER VALIDATION	3 CUSTOMER CREATION	4 COMPANY BUILDING
PIVOT			
1 Founders translate company ideas into business model hypotheses, test assumptions about customers' needs, and then create a "minimum viable product" to try out their proposed solution on customers.	2 Start-up continues to test all other hypotheses and tries to validate customers' interest through early orders or product usage. If there's no interest, the start-up can "pivot" by changing one or more hypotheses.	3 The product is refined enough to sell. Using its proven hypotheses, the start-up builds demand by rapidly ramping up marketing and sales spending, and scales up the business.	4 Business transitions from start-up mode, with a customer development team searching for answers, to functional departments executing its model.

founders’ vision and turns it into a series of business model hypotheses. Then it develops a plan to test customer reactions to those hypotheses and turn them into facts.

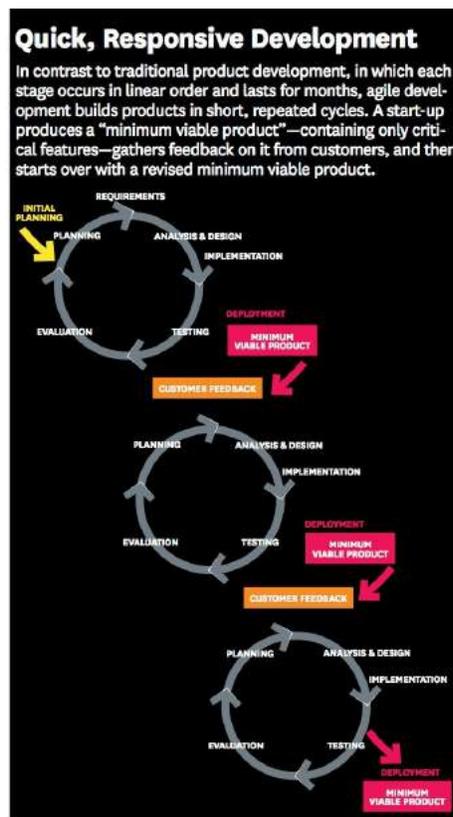
- *Customer Validation* tests whether the resulting business model is repeatable and scalable. If not, the team returns to customer discovery.
- *Customer Creation* is the beginning of execution. It builds end-user demand and drives it into the sales channel to scale the business.
- *Company-building* transitions the organization from a startup to a company focused on executing a validated model.

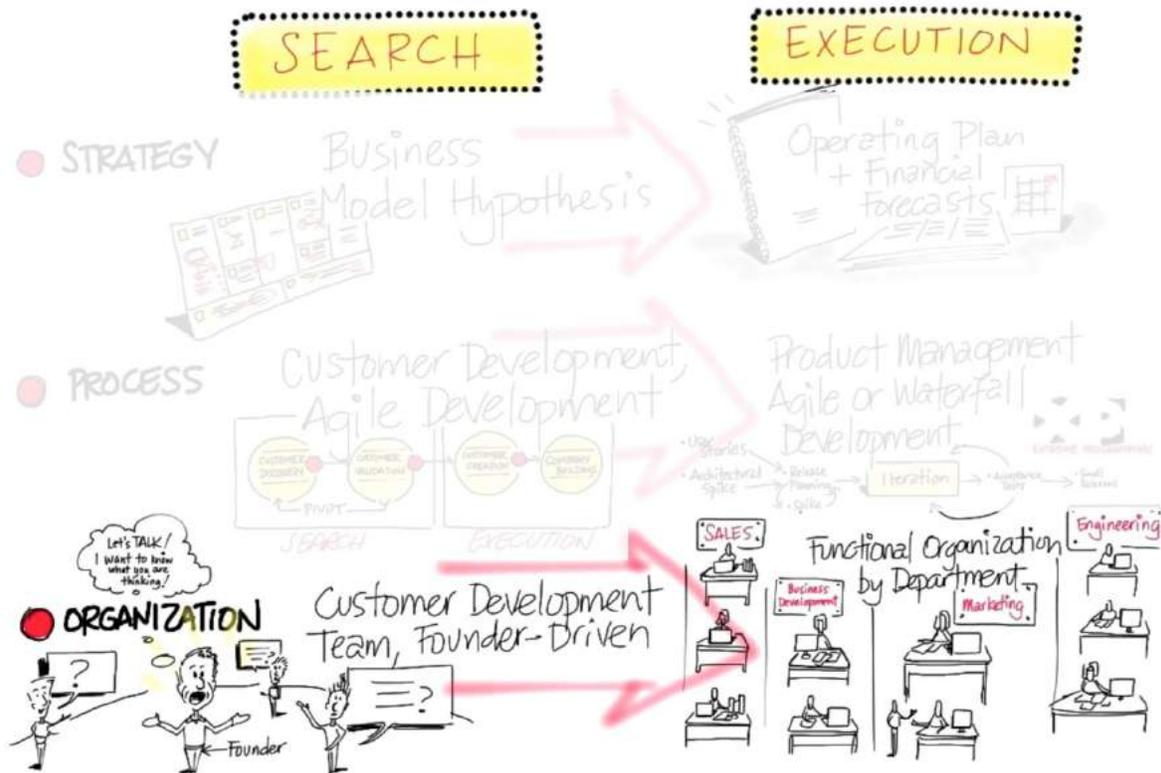
In the “search” steps, teams want a process designed to be dynamic, so they will work with a rough business model description knowing it will change. The business model changes because startups use Customer Development to run experiments to test their hypotheses that make up their business model (first testing their understanding of the customer problem, and then their proposed solutions). Most of the time, these experiments fail. *Search embraces failure as a natural part of the startup process.* Unlike existing companies that fire executives when they fail to match a plan, *the Lean Startup keeps the founders and fires the hypotheses by changing the mission model.*

Organization: Customer Development Team to Functional Organization

Once a new venture has found a business/mission model (meaning that it knows its beneficiaries, product/service, deployment, etc.), the organization “graduates” from new ventures status and moves from search mode to execution.

In an existing business or mission, the product execution process—managing the lifecycle of existing products and the launch of follow-on products—is the job of the [product management](#) and engineering organizations. It results in a *linear process* where teams make operating plans and refine them into detail. The more granularity added to a plan, the better people can execute it: a [Business Requirement Document](#) (BRD) leads to a Market Requirements Document (MRD), which then gets handed off to engineering as a [Functional Specifications Document](#) (FSD) implemented via Agile or Waterfall development.





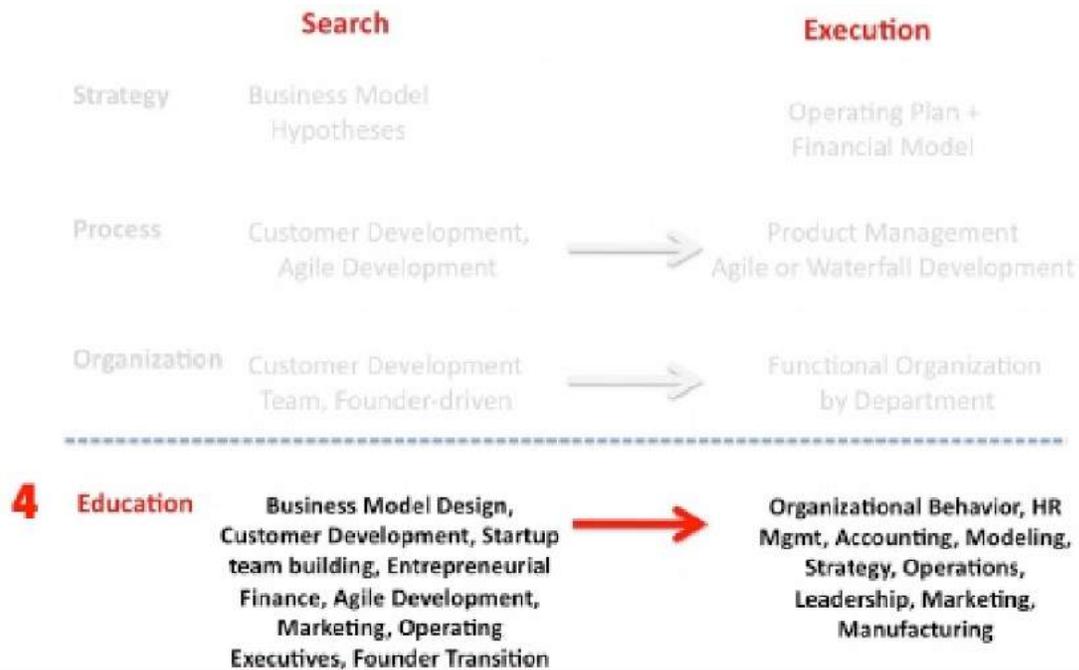
The search for a mission model requires a different organization from the one used to execute a plan. Searching requires the company to be organized around a Customer Development Team led by the founders. Only the founders can make the strategic decisions to iterate and/or pivot the business model, and to do that they need to hear customer feedback directly. In contrast, execution (which follows search) assumes that the job specifications for each of the senior roles in the company can be tightly defined. Execution most often requires a company to be organized by function (product management, sales, marketing, business development, etc.).

Companies in execution often suffer from a [“fear of failure culture,”](#) quite understandable since the executives were hired to execute a known job spec. In contrast, successful new ventures have Customer Development Teams have a “learning and discovery” culture that thrives on the search process. The fear of making a move before every last detail is nailed down is one of the biggest problems that existing companies have when they try to implement a “search” process.

The idea of not having a functional organization until the organization has found a proven business model is one of the hardest things for most new startups (and most early stage investors) to grasp. There are no sales, marketing, or business development departments when you are searching for a business model. If you’ve organized your startup with those departments, you are not really doing Customer Development. (It’s like trying to implement a startup using Waterfall engineering.)

Education: Search to Execution

Entrepreneurship as an academic discipline is only a few decades old. At first entrepreneurship classes were first taught as electives and are now part of core business school curricula. However, the field is still struggling to escape from the bounds of the business plan-centric view that startups are “smaller versions of a large company.” Venture



capitalists who’ve watched as *no startup business plan survived first contact with customers* continue to insist that startups write business plans as the price of entry to venture funding. This continues to be the case even as many of the best VCs understand that business “planning,” and *not* the “plan” itself, is what is important.

The trouble is that over time, this key message has gotten lost. As business school professors, many of whom lack practical entrepreneurial experience, studied how VCs made decisions, they observed the apparently central role of the business plan and proceeded to make the plan, *not the planning*, the central framework for teaching entrepreneurship. As new generations of VCs with MBAs came into the business, they compounded the problem: “That’s how we’ve always done it” or “That’s what I learned (or the senior partners learned) in business school.”

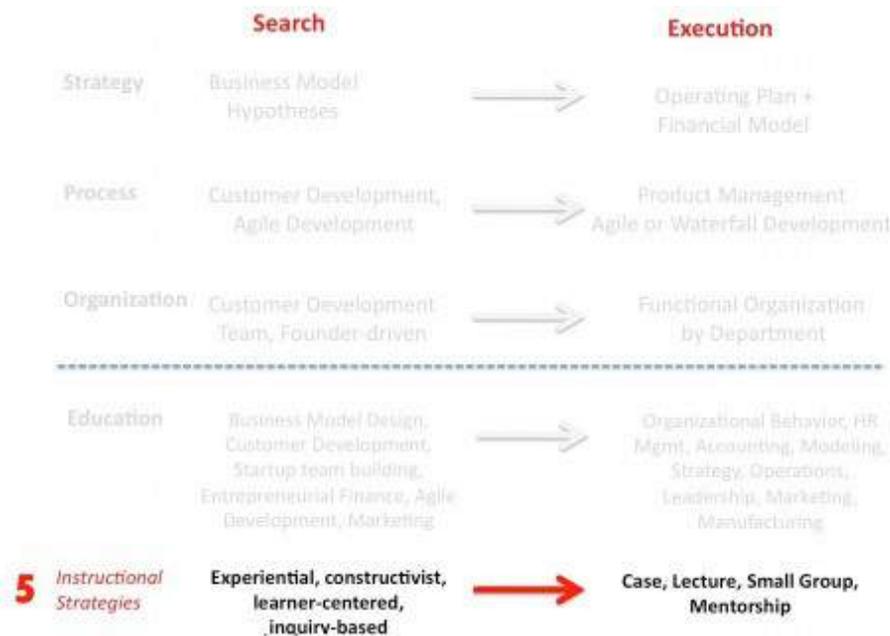
Entrepreneurship educators have realized that a plan-centric curriculum may serve for teaching incremental innovation, but it won’t turn out students prepared for the realities of building new ventures in a sea of uncertainty. Educators are only now beginning to build their own *E-School* curricula with a new class of management tools built around “search and discovery.” Courses such as Business Model Design, Product/Service Development, Customer Development, Startup Team-Building, Entrepreneurial Finance, Marketing,

Founder Transition, and so on all provide the startup equivalent of the management tools that MBAs need to learn to be successful in execution mode.

Instructional Strategy: Static to Dynamic

Entrepreneurial education is also changing the focus of the class experience from [case method](#) to hands-on experience. Invented at Harvard, the case method approach assumes that knowledge is gained when students actively participate in a discussion of a situation that could be faced by decision makers. At its heart, it is a simulation of a business context, putting the student in the role of the decision-maker.

But the search for a repeatable business model for a new product or service has no predictable pattern, it is a learning process in and of itself—not one easily reduced to a set of options or strategies. An entrepreneur needs to start with the belief that all of their assumptions are simply hypotheses that will undoubtedly be challenged by what they learn from customers. Analyzing a case in the classroom, removed from the realities of chaos and conflicting customer responses, adds little to an entrepreneur’s knowledge.



Cases methods of teaching are an oxymoron because the world of a startup is too chaotic and complicated. Context is always shifting, and the nuances are too subtle to be derived from “case facts.” The case method is the antithesis of how entrepreneurs build startups. By teaching pattern-recognition tools for the wrong patterns we wind up delivering limited value to aspiring entrepreneurs.

The replacement for the case method is not better cases written for startups. Instead, it would be a real-world immersive experience in business model design; using the business canvas as a way to 1) capture and *visualize the evolution* of business learning in a company, and 2) see what *patterns* match real-world iterations and pivots. It is a tool that better

matches the real-world search for the business model. It is the cornerstone of what we call “Evidence-Based Entrepreneurship”.

The Lean LaunchPad Method is best taught in a live case environment, where the cases being analyzed are the actual, real-time experiences of students (generally operating in teams) searching for repeatable and scalable business models for ventures they are seriously evaluating. This is done in a classroom where the students report on their experiences and receive real-time feedback from an instructional team of experienced practitioner-educators. The in-class discussion draws generalizable learning points from the specifics of each live case. These learning points are summarized and tied together to form the backbone of the pedagogical framework. In other words, the Lean LaunchPad Method draws the general framework from the specific experiences of the students.

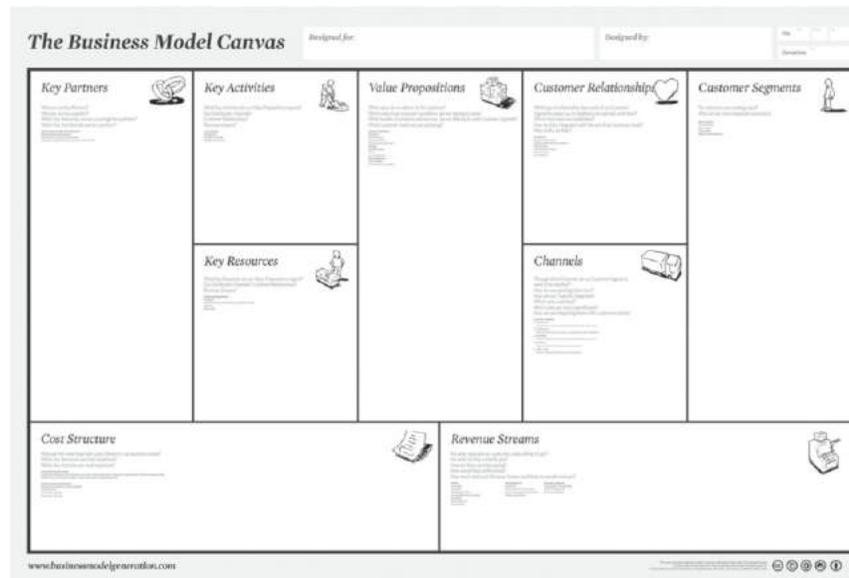
Such teaching presents challenges: It relies on a teaching team able to derive these lessons real-time, without the benefit of knowing when the opportunities will arise, and it places a premium for using precious in-class time for reporting out and discussing student experiences. These pressures have given rise to several pedagogical innovations: first, to preserve class time, the Lean LaunchPad class is typically taught with a “flipped classroom.” Here, the lectures are homework (such as interactive videos) and the homework (testing hypotheses in front of customers) is classroom discussion as all teams present. Second, to keep track of the students’ Customer Discovery progress, students record their customer, mentor, and instructor interactions in an online blog we use an online tool (LaunchPad Central) to record the week-by-week narrative of their journey and track the frequency of customer, mentor, and instructor interactions. And third, in class, students use a live “back channel” Google document to record observations and advice for their fellow classmates. All these elements are integrated by the teaching team during class discussion and in individual team meetings.

A comprehensive entrepreneurial curriculum will obviously have more extensive core classes based on theory, lecture, and mentorship. However we believe this shift toward fundamentally experiential learning, emphasizing discovery as the core of the learning process, makes a significant contribution. There’s embarrassingly little research on entrepreneurship education and outcomes, but we do know that students learn best when they can connect with the material in a hands-on way, making their own mistakes and learning from them directly. We need to test the limits of bringing these methods to the fore.

As much as possible, the curricular emphasis ought to be on experiential, learner-centric, and inquiry-based classes that help to develop the mindset, reflexes, agility, and resilience an entrepreneur needs to search for certainty in a chaotic world.

From the Business Model to the Mission Model Canvas

The Business Model canvas represents the activities a company needs to deliver to provide value (a product or service) to its customers and revenue and profit to itself. It draws these activities in a diagram of nine boxes, summarizing the company’s product/service, customers, channels, demand creation, revenue models, partners, resources, activities, and cost structure.

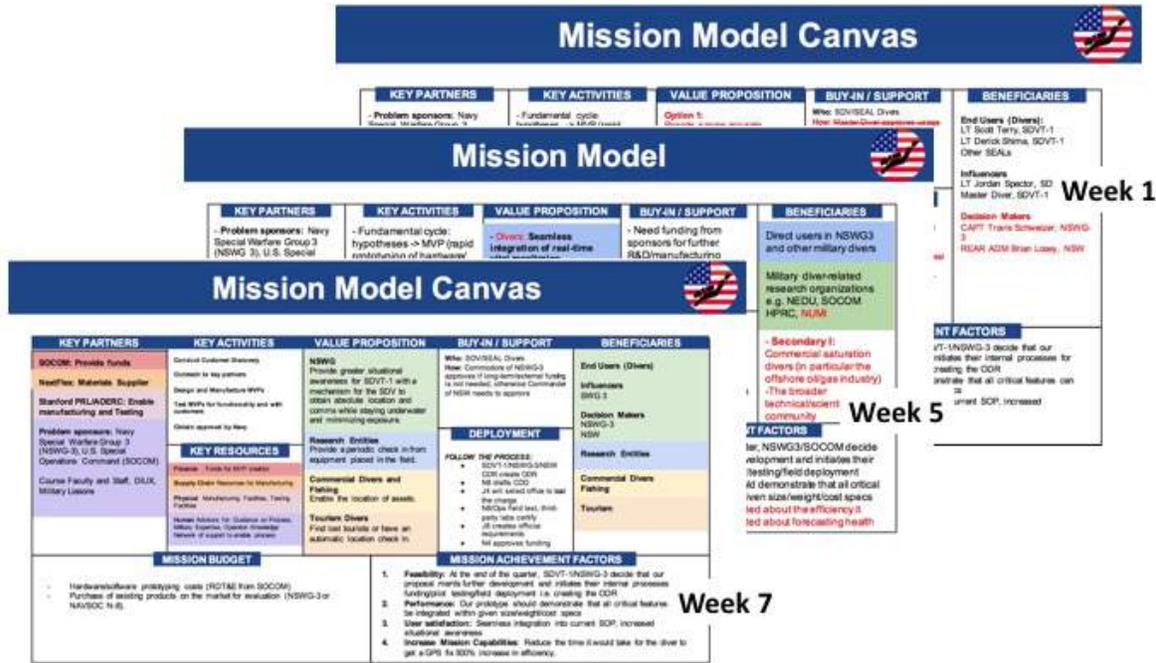


Unlike a business *plan* where everything written is assumed to be a fact, in the business model canvas we assume that everything is an untested *hypotheses* that needs to be tested.

In addition to using the Business Model Canvas as a static snapshot of the business at a single moment, Customer Development (the process we use to test these hypotheses)— and this class—extends the canvas and uses it as a “scorecard” to track progress week by week as the teams search for a repeatable, scalable Business Model.

Every week, the teams update their Canvas to reflect any pivots or iterations, highlighting in red the changes from the last week. Then, after the team agrees to the business model changes, they integrate them into what becomes the new Canvas for the week (the accepted changes in red are then shown in black). During the next week, any new changes are again shown in red. The process repeats each week, with new changes showing up in red.

By the end of the class, teams will have at least eight Canvases. When viewed one after another, they show something never captured before: the entrepreneurial process in motion.



Turning the Business Model into the *Mission Model Canvas*

The Business Model Canvas has been a great invention for everyone from startups to large companies. Unlike an org chart, which describes how a company *executes* to deliver known products to known customers, the Business Model Canvas illustrates the *search* for the unknowns that most new ventures face. The 9 boxes of the canvas let you visualize all the components needed to turn customer needs/problems into a profitable company.

Revenue Streams to Mission Achievement

The Business Model Canvas has served all of us well in thinking about building

businesses – and therein lies the problem. In a business the aim is to earn more money than you spend. What if you’re a government or a military organization or part of the intelligence community? In these cases you don’t earn money, but you mobilize resources and a budget to solve a particular problem and create value for a set of beneficiaries (customers, support organizations, warfighters, Congress, the country, etc).

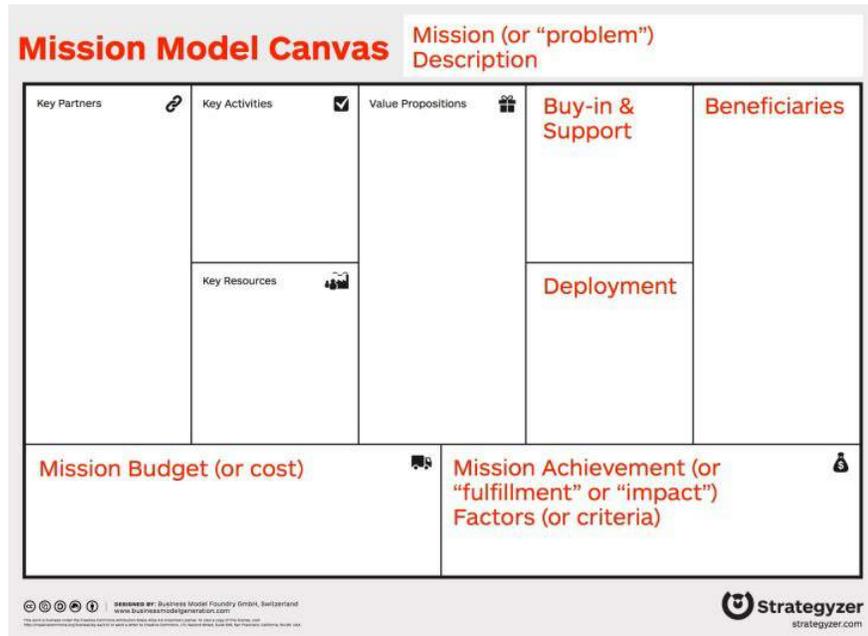
For these organizations, the canvas box labeled *Revenue Streams* doesn’t make sense.

In a mission-driven organization such as the defense and intelligence community, *there is no revenue to measure*. So the first step in building a canvas for mission-driven organizations is to change the *Revenue Stream* box in the canvas and come up with a counterpart that would provide a measure of success.



We're calling this alternative *Mission Achievement*. Later we'll explain how to measure and describe *Mission Achievement*, but first our *Mission Model Canvas* needs four more tweaks.

- Customer Segments is changed to Beneficiaries
- Cost Structure is changed to Mission Cost/Budget
- Channel is changed to Deployment
- Customer Relationships is changed to Buy-in/Support



Customer Segments to Beneficiaries

At first glance, when developing a new technology for use in the defense and intelligence community, the customer appears obvious – it's the ultimate war fighter. They will articulate pains in terms of size, weight, form fit, complexity and durability. But there are other key players involved. Requirement writers and acquisition folks look at systems integration across the battlefield system, while contracting officers, yet another segment, will count beans, measure the degree of competition and assess the quality of market research involved. The support organizations need to worry about maintainability of code or hardware. Does legal need to sign off for cyber operations? So yes, war fighters are one customer segment, but others need to be involved before the war fighter can ever see the product.

So the first insight is that in the defense and intelligence community mission models are always multi-sided markets with the goal of not just building a great demo but getting the product adopted and deployed.

Second, in the defense and intelligence communities almost all of the mission models look like that of an OEM supplier – meaning there are multiple layers of customers in the value chain. Your product/service is just part of someone else's larger system.

So to differentiate “customers” from the standard business model canvas we’ll call all the different customer segments and the layers in the defense and intelligence value chain *beneficiaries*.

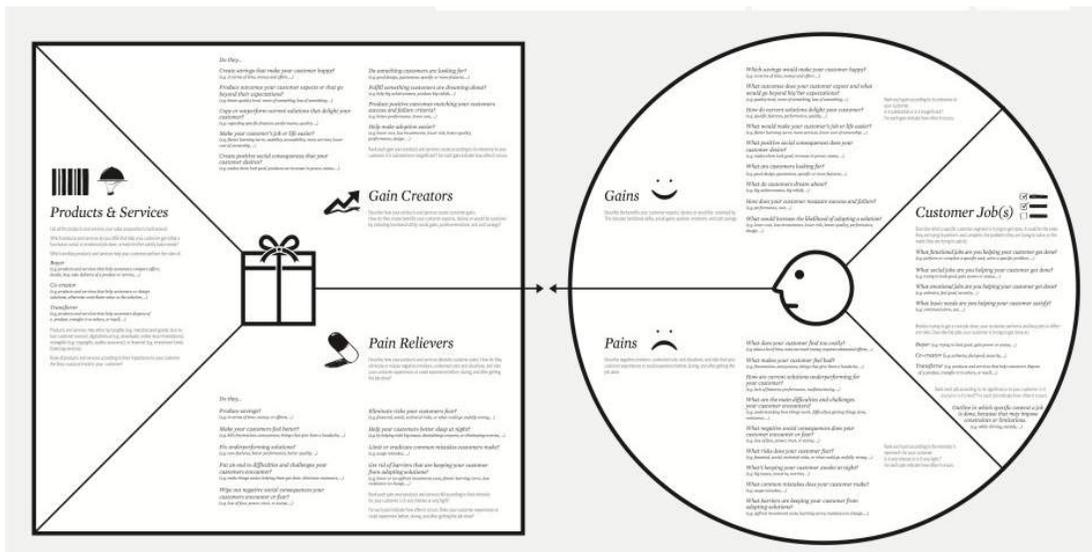
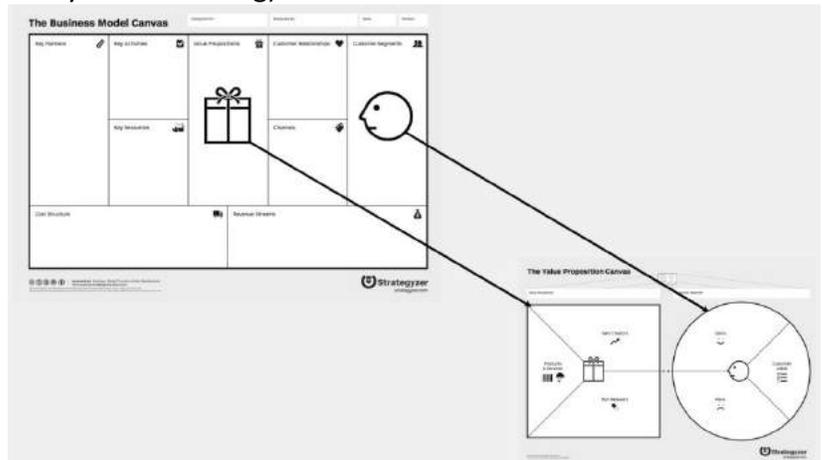
The Value Proposition Canvas

Of all the nine boxes of the canvas, two important parts of the model are the relationship between the *Value Proposition* (what you’re building) and the beneficiaries. These two components of the business model are so important we give them their own name, *Product/Mission Fit*.

Because of the complexity of multiple beneficiaries and to get more detail about their gains and pains, Osterwalder added

an additional canvas called the Value Proposition Canvas. This functions like a plug-in to the Mission Model Canvas, zooming in to the value proposition to describe the interactions among these beneficiaries, war fighters, etc. and the product/service in more detail.

Using the Value Proposition Canvas with the Mission Model Canvas lets you see both the big picture at the mission model level and the detailed picture of each beneficiary at the “product/mission fit” level.



In the defense and intelligence community mission models, there will always be multiple beneficiaries. *It’s important that each beneficiary gets its own separate Value Proposition Canvas.*

Distribution Channels to Deployment

In the commercial world we ask, “What type of distribution channel (direct sales, app store, system integrator, etc.) do we use to get the product/service from our company to the customer segments?” For the Department of Defense or Intelligence organizations, we ask instead:

- “What will it take to deploy the product/service from our current Minimum Viable Product to widespread use among people who need it?” (What architecture components can they innovate on and what can’t they?)
- “What constitutes a successful deployment? (number of users, units in the field, time to get it into the field, success in the field, etc.)”
- “How do we turn a [Horizon 3 innovation](#) into something [that gets adopted by a Horizon 1 organization](#)?”

Customer Relationships to Buy-In/Support

In an existing business, *Customer Relationships* is defined as establishing and maintaining a relationship to support existing customers. In a startup we redefined *Customer Relationships* to answer the question: How does a company get, keep and grow customers?

For the defense and intelligence communities, we have modified *Customer Relationships* to mean, “*For each beneficiary* (customer segment), how does the team get “Buy-In” from all the beneficiaries?”

Customer discovery helps you understand whose *buy-in* is needed in order to deploy the product/service (legal, policy, procurement, etc.) and how to get those beneficiaries to buy-in? (Funding? Mandates? User requested? etc.) In addition, the long-term support and maintenance of new projects need to be articulated, understood and bought-into by the support organizations.

At the Pentagon a favorite way to kill something is to coordinate it to death by requiring buy-in from too many people too early. How to determine who are the small group of critical people to get buy-in from – and how to determine who are the next set required to sustain the iterative development of future MVP’s – is one of the arts of entrepreneurship in the defense and intelligence community.

Revenue Streams to Mission Achievement

Mission Achievement is the value you are creating for the sum of all of the beneficiaries / the greater good.

It’s important to distinguish between the value for individual beneficiaries (on the Value Proposition Canvas) and overall *Mission Achievement*. For example, *Mission Achievement* could be measured in a variety of ways: the number of refugees housed and fed, the number of soldiers saved from roadside bombs, the number of cyberattacks prevented, the increased target surveillance of sensor fusion, etc. None of these are measured in dollars and cents. Keep in mind, there is only mission achievement if it delivers value to the end beneficiary.

Hacking For Defense Pedagogy: Experiential Learning

Hacking for Defense is a hands-on program that immerses student teams by having them test their business model hypotheses outside the classroom. Inside the classroom, it deliberately trades off lecture time for student/teaching team interaction.

Hacking for Defense uses the Customer/Beneficiary Development process and the Mission Model Canvas to collapse the infinite possibilities of a startup into a set of solvable problems. This class uses *experiential learning* as the paradigm for engaging the participants in discovery and hypotheses testing of their business models. From the first day of class, teams get out of the classroom and learn by doing. Experiential learning has been around forever. Think of guilds and the apprentice system: mentors were the master craftsmen. That's the core idea behind the structure of this class.

This is very different from how a typical business school “how to write a business plan” class works. There, it assumed *a priori* that there was a valid business model. In the Hacking for Defense class, the teams are *not* building a business (yet). Information they learn from beneficiaries will inform them and validate/invalidate their hypotheses (thesis). Throughout the course the teams will modify the mission model (as they iterate or pivot). This results in the teams bringing sponsor needs and market needs in dual use cases forward, after which they can decide if there's a worthwhile business to be built.

What this class does *not* include is *execution* of the business model. This course is all about discovery outside of the classroom. As this discovery process unfolds it results in a high degree of confidence that a viable business model exists, then and only then would be the time to create an execution plan. If the student teams continue with their companies, they will assemble the appropriate operating plans (e.g., financial models, revenue plans, cash flow statements, balance sheets, etc).

The Flipped Classroom

The class is run using a “flipped classroom.” Instead of lecturing about the basics during class time, the instructor assigns the core lectures as homework. Steve Blank has recorded eight 30-minute class lectures, each with quizzes to support the Lean LaunchPad course. Similar class lectures will be made available for students in the Hacking for Defense course. Students watch a lecture on each component of the Mission Model Canvas take a short quiz, and come to a class prepared with questions about the topic. Students will use that new knowledge to test that specific part of the mission model.

(Of course, if they prefer, instructors could deliver the lectures in person.)

Instructors then supplement the video lectures with their own in-class short lecture about the week's mission model topic. This allows instructors to use the class time for review of the concepts or advanced topics.

Team Teaching: Students up Front

Rather than a single instructor lecturing in front of the classroom, the class is organized around the concept of a *team* of instructors commenting and critiquing on each team's progress—sitting in the **back** of the classroom. It's the students standing up in front of the class every week, sharing their progress who are doing the teaching while getting the instructors' comments and critiques. While the comments may be specific to each team, the insights are almost always applicable to all teams.

The Hacking for Defense class described in this document is not a survey or introduction to entrepreneurship class. It is designed as a simulation of real world entrepreneurship: hard, chaotic, intense, and rewarding. As instructors, you'll push students harder than in any other class they will take. Not all students can make it through. Your role is to inspire them, encourage them, and push them, but in the end they need to decide whether entrepreneurship focused on helping military, intelligence and other public sector organizations accomplish their mission is for them. This class will help them decide. For you as an instructor **this, “pushing students” might be the hardest part of the class.**

Soliciting DOD/IC Project Topics of Interest

Elements of the Department of Defense, the Intelligence Community and other government agencies have agreed to provide a list of specific project topics of interest for use in H4D courses. H4D Topics to date have come from a range of organizations including: [Special Operations Command](#) (SOCOM), [Joint Special Operations Command](#) (JSOC), US Army Special Operations Command, [Naval Special Warfare Command](#) (NSWC), and from other government agencies such as the Department of State, National Security Agency, Defense Innovation Unit (Experimental) (DIUX), the National Geospatial Intelligence Agency (NGA) and the Joint Improvised Threat Defeat Agency (JIDA). Going forward, H4D problems may also come from agencies with domestic responsibilities such as the Department of Homeland Security or State and local agencies. Not all problems will have a technology focus. Some will be based on issues of policy or diplomacy.

H4Di.org is the focal point for problem generation, vetting, and validation of government programs. All problems sourced to Hacking for Defense & other supported classes will go through H4Di.org's vetting process before being made available for selection by student teams. This does not preclude universities from using their local resources to generate problems, however, in an effort to maintain quality control and ensure consistency with established course standards, problems generated at the university level will still need to pass through the vetting process at H4Di.org before being made available to student teams.

Based on the Problem sponsor's capacity and preferences, they may restrict the number of class sessions their problems will be offered per year. They may also designate the problem for use at a particular university. Likewise, a university may coordinate with H4Di.org and request help in generating problems associated with the university's strengths or within certain research areas.

Selecting Optimal Class Problems

Problems nominated by government sponsors or submitted by individual universities are consolidated and vetted for inclusion in the H4D Problem Portfolio maintained by H4Di.org. Priority for inclusion in H4D classes is assigned to those problems whose solutions can have immediate national impact.

Problems with potential dual-use solutions that could attract private capital as well as government sponsor support are also given priority for use in the course. To support this, H4Di translates DOD/IC topics into commercially recognizable terms and provides additional context, such as storyboards and vignettes that would allow students, faculty, local mentors and advisors and private capital investors to understand the potential value of solving a proposed problem.

DOD/IC Topic Submission Guidelines

These topic descriptions are not detailed acquisition requirements. Nor are they broad general technology requirements or research questions. They are developed to best facilitate solving a specific set of customer/user/stakeholder *problems*.

Sponsors/Program managers need to help potential student teams assess what beneficiary/user/stakeholder *problems* are of interest and what expertise they believe the teams need to solve them.

The goal for the **students** in the class is to get a deep enough understanding of the beneficiary problem to come up with a minimal viable product that the program sponsor says, “Wow, let’s figure out how to get this deployed/used/acquired.”

Realistic **problem selection** is incredibly important. Although the problem presented may be unclassified, the beneficiary may intend for the application or implementation of the solution to be classified. At a minimum, it may be Unclassified for Official Use Only.

Program managers/mentors should consider problems where the entire use case (including the deployment) can be discussed with the teams.

In some cases, the problem sponsor may want to offer an unclassified analog to a problem but not discuss the deployment or use details. H4Di.org can help sponsors create analogs.

See the sample Problem Proposal below that an interested DOD/IC agency or other USG organization would submit. No formal Memo of Understanding is needed but by submitting a problem, the sponsor organization certifies that the problem is unclassified and suitable for use by students in an open university campus environment. Our goal is to keep it extremely simple.

DOD Hacking for Defense (H4D) - Problem Proposal (Sample)

Problem Title:

Challenge: One sentence description of the challenge.

Background: 4-5 sentences providing a general description of the problem to be solved. Why is this important?

Boundaries: Used to define a box for students to operate in. Provide bullet comments:

- Describe technical thresholds that may be desirable (don’t write requirements)
- Environmental conditions to consider
- Technologies that might be relevant
- Other clarifying information

Do not exceed one page

H4Di.org translates government problems to student topics before they are made available to Universities for use in their courses. H4Di.org validates that each problem meets a minimum set of requirements and verifies that the contact information provided for the problem point of contact is accurate before posting the problems to the H4D web portal.

Topic Visibility

H4Di.org will make problems available to universities 90 days -before their scheduled class start date. Teams can form around any one of the posted problems or may request to add their own problem to the class. If a team adding a problem is selected to enter a course the teaching team will forward the problem statement to H4Di.org for vetting and registration.

Prospective teaching teams are strongly encouraged to coordinate as early as possible with H4Di regarding their intent and timeline to teach H4D at their respective university. The sooner H4Di can anticipate a university course, the better it can prepare to distribute problems. At a minimum, H4Di requests statements of intent from new universities endeavoring to teach the class no later than 120 days before their class starts. For fall classes especially, early coordination is essential so that teaching teams can receive problems and select student teams before beginning summer break.

Multiple Teams Per Topic

There may be projects that generate interest from multiple qualified student teams. If the DOD/IC sponsor is interested, at the discretion of the faculty, up to two teams may work on the same project.

DOD/IC and other USG Benefits

- All intellectual property developed during the class (code, hardware, concepts, MVPs, prototypes, etc.) are open source – with the following caveats:
 - Individual team members own what intellectual property (patents, hardware, algorithms, etc.) they brought to class with them
 - The university may have licensing claims on prior university sponsored research
- Sponsoring agencies may offer teams or individuals follow-on activities/funding in their facilities/incubators to deliver capabilities to their operators

DOD/IC and other USG Responsibilities

Each agency or organization who sponsors a problem to the class has agreed to provide:

- a detailed topic description and suggested team expertise to solve it
- a sponsor that is the single point of contact for the team
- an “In-service champion” who will do something with the results.

Sponsors commit to:

- Provide student access to their beneficiary segments, including Concept developers, Requirement writers, Buyers (Acquisition PM's), Users, Prime contractors
- Pitch their problem at the Info Sessions (Video TeleConference or in-person) for 10-minutes at two prospective student info sessions focused on the guts of their problem – not the history of their organization.
 - Not a requirements pitch. It should be compelling pitch about the problem and why it matters.
- Identify the first 10 people who the student team needs to talk to **before** the class starts. Required to help with the first draft of the Mission Model Canvas (send blog MMC to sponsors).
- *Attend a 1-hour mentor onboarding and orientation session run by the University (via Video TeleConference (VTC) or in-person)*

During Class, Provide mentoring and beneficiary access:

- Brief teams after they've been accepted to the class and help them talk to their first 10 beneficiaries *before* class starts
- Watch the online video and become familiar with the Lean Startup methodology
- Mentor the teams via Video TeleConference (VTC) at least 1 hour/week
 - Provide a primary and secondary contact
- Provide access to a critical mass of users/stakeholders/partners for interviews (100 when practical)
- Act as an “interview broker” to navigate the “no cold-calls” problem in the IC Community

Brokered Interviews

In the IC Community cold calls are viewed with suspicion and not returned (and are reported.) Therefore, the IC sponsor will agree to act as a “broker” for the interview process via Video TeleConference (VTC). In some interviews VTC will not be available and phone interviews will have to suffice.

Forming Student Teams

We prototyped this class at Stanford in Spring 2016 as MS&E 297 and are scheduled to teach the course again in Spring 2017. The Stanford Hacking for Defense Class is listed as a graduate class in the Engineering School in the [Management Science & Engineering Department](#). Our original course description is below.



MS&E 297: “Hacking for Defense”: Solving National Security issues with the Lean Launchpad

In a crisis, national security initiatives move at the speed of a startup yet in peacetime they default to decades-long acquisition and procurement cycles. Startups operate with continual speed and urgency 24/7. Over the last few years they’ve learned how to be not only fast, but extremely efficient with resources and time using lean startup methodologies.

In this class student teams will take actual national security problems and learn how to apply “Lean Startup” principles, (“business model canvas,” “customer development,” and “agile engineering”) to discover and validate customer needs and to continually build iterative prototypes to test whether they understood the problem and solution. Teams take a hands-on approach requiring close engagement with actual military, Department of Defense and other government agency end-users.

Team applications required in February. Limited enrollment.

2015-2016 Spring

- MS&E 297 | 4 units | Class # 47395 | Section 01 | Grading: Letter (ABCD/NP) | LEC
- 03/28/2016 - 06/01/2016 - with Blank, S. (PI); Byers, T. (PI); Felter, J. (PI)
- **Instructors:** Blank, S. (PI); Byers, T. (PI); Felter, J. (PI)

Admission to the Class

- At Stanford, we list Hacking for Defense as a graduate course but make it open to all students.
- A diversity of academic majors is welcomed and encouraged. Ideally every team will have at least one student with an engineering, computer science or other technical background. Importantly, no military experience is required.
- Unlike most classes admission to this class is by *pre-formed teams* of 4. (See team formation section below.)
 - Teams may have additional resources outside of class work on the project.
- For a 3 hour class once per week where all teams present each session, we find that *eight teams of four students* per class is the maximum that can be accommodated.

Open to All Students

While we list the class as a graduate-level class we do accept undergraduates. However, we limited the number of undergraduates per team to 1 and on rare occasion 2. We do this because we’ve found that the “relentlessly direct” style of teaching rattles students who have not yet experienced the chaos and conflict in the working world.

All the problems the teams will be working on are unclassified. The sponsors understand that the class is open to foreign nationals.

Team Size of Four

We've found that teams of 4 feels like the right number of a university class. However, we have made exceptions for teams of 3 (but it is an enormous amount of work) and teams of 5 (they tend to get in each other's way.)

Additional resources outside of class

If the teams have resources working on building the Minimal Viable Products outside the class that's great. However all the customer discovery must be done by the students themselves. We do not let outsiders present or comment in class.

Eight Teams

We've tried to teach the class with more than 8 teams in one classroom and found that is simply exhausting for everyone. Six teams is actually optimal but we teach with 8 to accommodate the students. Four teams would still make a good class. The optimal number of teams admitted will also be impacted by the teaching team size and class period length at the host university.

Preformed Teams

We found that having the students come into the class with an already-formed team accomplishes three things:

- It saves weeks of class time. Students have met, gotten to know each other, have brainstormed their sponsor's problem, and are ready to hit the ground running.
- It decreases many of the challenging team dynamics issues of learning which students can't work with each other. Most (though not all) of these issues get worked out pre-class on their time, not the instructors'.
- Most importantly, we get to select student teams for their passion, interest, curiosity, and the ability to learn on their own.

Team Formation: Brown Bag Lunches, Information Sessions, & Office Hours

Beginning ten weeks before class starts, we found it helpful to sponsor two brown bag lunches and two evening Information Sessions/Mixers, and Instructor Information Office Hours. (See Appendix B for detailed agenda.)

Your teaching assistant is responsible for creating demand for these events and ultimate the class, as well as the event logistics. Details of the specific TA responsibilities are in the Teaching Assistant Handbook. (Often TAs confuse buying pizza and getting a room for the event with demand creation for the class. Make sure they and you are not confused.)

The Brown Bag lunch talks about the problem we want to solve. For the brown bag lunch, we schedule a one-hour lunch-time talk during the week about the general topic of how the Lean Methodology can provide solutions at speed to current defense needs. Our teaching assistant schedules the classroom and promotes the event with posters all over campus, emails to department lists, etc. Likewise, our team personally engages military service members in the student body and other veterans within the university to elicit them to encourage student and mentor participation.

The Info Session talks about the specific mechanics of the class, the sponsor problems and offers students a mixer to build teams. For the Information Sessions/Mixer our teaching assistant organizes a 2-hour evening session during the week, and we provide pizza and refreshments. The information session is one hour and the mixer is the second hour. The teaching team members introduce themselves and provide a 30-minute overview of the class and details of the problems we are looking to solve. We ask for sponsors of the DOD problems to provide 2-minute video summaries of their problem (optionally sponsors can Video TeleConference (VTC) into the class to market their problem. To wrap this portion of the info session we take questions from the potential students.

After the information session – in the 1-hour mixer, we have each student stand up and introduce themselves (background, interests and what problem they want to work on). The teaching team then leaves the students to mix over Pizza and see if they can form teams.

The goal of this session is to get students to 1) get excited/interested in the class, then go to the class website, 2) on the website put their names on the sign-up sheet.

After the information sessions, but before the team interviews, the teaching team offers Instructor Information Office Hours. These are 15-minute office hour slots for any teams who want to bounce ideas off of an instructor or get a more detailed feel for the class.

Brown Bag agenda

This is a simple story. No PowerPoints, just a conversation with the students. A suggested flow might be:

- Introduce the Teaching Team
- summary of the problem; ISIS, cyber, etc (as articulated in the blog post)
- real-world examples of the problem warfighters face (“war-stories”)
- how does the military solve this today (talk about the traditional acquisition and procurement cycle)
- how are emerging islands of innovation in the military trying to solve this (REF and other organizations)
- Lean in startups, NSF, NIH, and in Universities
- What we want to accomplish in the H4D class at Stanford and across the U.S. (scale and tech, policy, etc.)
- Point them to class website

Info Session / Mixer agenda

This session has three parts:

Presentation about the class 30 minutes.

- Nature of the problem
- Class Structure
- Support structure (Mentors, sponsors, etc.)
- Sponsor Pitches – (on-line)

Sponsor Presentations, 30 minutes

- Sponsors need to generate enthusiasm –why is this problem important?
- What are the core of your problem - not the history of your organizations
- ID the first 10 people you will help your student team talk to before the class starts. This is needed to help the students draft of the Mission Model Canvas (send blog MMC to sponsors).

Student Q&A, 15 minutes

- Go over the frequent asked questions (Nationality eligibility, Team size, Etc.)
- Take student questions

Student Mixer 45 minutes

- Each student stands, one-at-a-time, they introduce themselves, describe their relevant backgrounds and say what project/team they are interested to work on.
- Students then mix.

Faculty is available for one-on-questions.

Marketing the Class

We describe the class to students as, “Learn how to innovate at speed while helping make the world a safer place.” Emphasis is that the world is at a critical time, real threats in Paris, Syria, and that we can contribute to make it safer for everyone. Details of the specific TA responsibilities for creating demand for the class are in the Teaching Assistant Handbook.

Your class website and Facebook page are the center of your demand creation activities for your class. Feel free to use/borrow/copy example course website here: hacking4defense.stanford.edu. The website will have a link to the team application form and the student signup sheet.

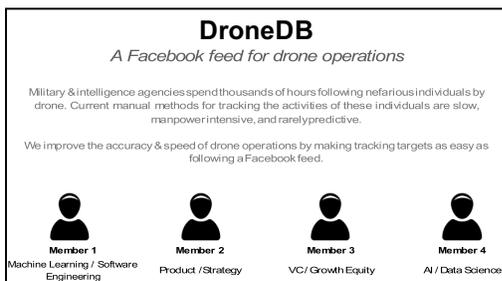
Team Application Form

Students apply as teams. They tell us about themselves and their team in four slides using the *Team Information*, *Mission Model Canvas Value*, *Proposition Canvas* and *Petal Diagram* (See below for examples and go to H4Di.org for sample templates.)

By design the application requires students to do a bit of reading to understand the Mission Model and Value Proposition Canvas. Using the Mission Model Canvas as an application form gets the teams thinking long before the class starts about some of the fundamental questions regarding their team project, such as “What is a mission model? And to do some preliminary thinking about the problem they want to solve, who they are going to solve it for.

We set the pace and tempo of the class by having the teams talk to 10 beneficiaries (Beneficiaries/stakeholders/war fighters) *before* the start of the class. On the first day of the class teams present their updated Mission Model Canvas based on what they learned before class started. This way teams hit the ground running.

If the product/service is a replacement or enhancement of an existing product/service we ask the teams to draw a “petal diagram” of the existing offerings. This places their product/service in the center, and the existing solutions as leaves on the sides. The goal is to have them articulate the current offerings and be able to explain how they are better, faster, cheaper, etc.



Slide 1: Title Slide **example**

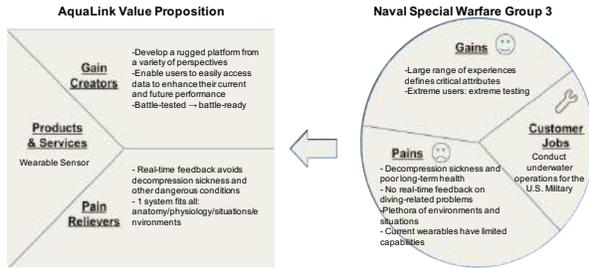
	Team Member 1	Team Member 2	Team Member 3	Team Member 4
Academic Program	MBA + MA Ed 2016	MS CS 2017	MSAE 2016	MBA 2017
LinkedIn	Link	Link	Link	Link
Subject Matter Expert?	Yes (First Intelligence Officer)	No (UI/UX Design)	No (Software Engineering)	No (Proj Mgr & Communicator)
Role	Product	Designer	Hacker	Hustler
Experience Solving a Problem that Seemed Impossible	- Deployed to Afghanistan why? what did they do? - Led 10000 team for 14k in the combat zone to find 50 high value targets	- Example	- Example	- Example

Slide 2: Team Member Details – **example**

Hacking for Defense Educators Guide

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	BUY-IN / SUPPORT	BENEFICIARIES
<ul style="list-style-type: none"> - Problem sponsors: Navy Special Warfare Group 3 (NSWG3), U.S. Special Operations Command (SOCOM) - Military diver-related research organizations: Navy Experimental Diving Unit (NEDU), SOCOM Human Performance Optimization Center - Commercial partners: medical device/wearable companies, mi-spec dive equipment manufacturers 	<ul style="list-style-type: none"> - Fundamental cycle: hypotheses > MVP (rapid prototyping of hardware/software) > stakeholder interviews to evaluate MVP > pivot and repeat 	<ul style="list-style-type: none"> - Seamless integration of real-time vital monitoring with conventional dive computer capabilities: alerts protect divers from immediate lost-time accidents and long-term injuries, easy to deploy with minimal training - Create the Navy's first long-term repository of diver health data: detailed dataset to improve training/operation protocols 	<ul style="list-style-type: none"> - Need funding from sponsors for further R&D/manufacturing - Need evaluation/ certification by NEDU before field deployment - Early adopters 	<ul style="list-style-type: none"> - Primary I: Direct users in NSWG3 and other military divers - Primary II: Military diver-related research organizations e.g. NEDU, SOCOM HPOC - Secondary I: Commercial saturation divers in particular the offshore oil/gas industry) - Secondary II: The broader technical/scientific diving community
MISSION BUDGET <ul style="list-style-type: none"> - Hardware/software prototyping costs - Purchase of existing products on the market for evaluation 		MISSION ACHIEVEMENT FACTORS <ol style="list-style-type: none"> 1. Feasibility: At the end of the quarter, NSWG3/SOCOM decide that our proposal merits further development and initiates their internal processes for funding/pilot testing/field deployment 2. Performance: Our prototype should demonstrate that all critical features can be integrated within given size/weight/cost specs 3. User satisfaction: Direct users are excited about the added functionality that our solution will bring and want it adopted 		

Team | Mission Model | Value Proposition | Competitive Landscape | Who's our Client? | Goals



Team | Mission Model | Value Proposition | Competitive Landscape | Who's our Client? | Goals

Slide 3: Mission Model Canvas example



Slide 5: Petal Diagram – example

Team Interviews

Teams who are interested apply online and admission is by team interview. The entire teaching team (and the DOD/IC sponsor for that team) interviews each team. Team selection is based on:

- Team interest and commitment to the problem selected
- Team technical expertise/background to reasonably understand and solve the problem

The teaching team interviews all teams, generally in 15 minute “speed dating” sprints. We use a shared Google doc grading form similar to the one below as a useful way of keeping track of each team’s candidacy.

Team Makeup and Roles

The posted problems will allow the four-person teams to decide the best makeup of their teams.

Given that the teams are going to be rapidly producing Minimum Viable Products that are technical we like to see at least two of the four team members have technical skills commensurate with the problem/solution they’ve chosen. At the same time we tend to discourage teams with all 4 members being technologists.

The teams will self-organize and establish individual roles on their own. We've found that having the teaching team try to form teams creates zero team cohesion: "I didn't do well because you assigned me to people I didn't like."

Within teams there are no formal CEO/VPs, just the constant parsing and allocation of the tasks that need to be done. By design, the teams need to figure out how to collaborate.

Admission

Teams are admitted on the basis of their match between the problem they selected, their team composition and the teaching team's judgment about their likelihood of successful completion of the class objectives. (Sponsors may listen into the team interviews and ask questions but have no official role in team selection admission.)

Our past experience is that passion for the class and problem make up for a lot of sins. However, be sure that the technical folks on the team are equally committed. One of the common failure mode of teams is that a team member is doing another startup the same time as this class. In the past we've neglected to insist that this class be the only startup project they're working on during this quarter/semester. This was a mistake, as students would run out of bandwidth and literally abandon their teams for a more promising project they were working on. We now make them pledge that this is the only startup project they will work on during this class.

Therefore our rule - due to the workload in class this can be the only startup you are doing this semester/quarter.

Amount of Work

We remind students that this class is a simulation of what startups and entrepreneurship are like in the real world. They'll confront chaos, uncertainty, impossible deadlines in insufficient time, and conflicting input.

As a result, the class requires a *phenomenal amount of work by students, especially compared to most other classes*. Teams have reported up to 15 hours of work per student per week. Getting out of the classroom is what the effort is about. If they can't commit the time to talk to beneficiaries, this class is not for them. Teams are expected to have completed at least 10 in-person or Video TeleConference (VTC) interviews each week.

This means in total over the 10-week course, the students will have completed at least 100 interviews.

Time and again students tell us, "We didn't know how hard this class will be." So we put a "black box" warning in the syllabus describing the amount of work. We want them to understand that the class requires a *phenomenal amount of work by students, especially compared to most other classes*. Projects are treated as real startups, so the workload will be *intense*.

Teams have reported up to 20 hours of work each per week. Getting out of the classroom is what the effort is about. If you can't commit the time to talk to beneficiaries, this class is not for you. Teams are expected to have completed **at least 10 in person or Skype interviews each week** focused in the Business Model Canvas area of emphasis for that week. **In the 2nd and 3rd week of class, we expect at least 15 interviews to get up to speed quickly on beneficiaries and value propositions.**

Pre-class Work

Between the time the teams are admitted, and before the class starts, teams need to conference with their DOD/IC sponsor and mentors and:

- Begin to understand the types of beneficiaries (program managers, warfighters, etc.)
- **Schedule and interview 10 beneficiaries *before class***
- Map out the first hypotheses they want to test and develop and present their first MVP on day one of the class

Team Dynamics

Just as in a real startup, the demands and pressure of the class can create conflicts within teams. In almost every cohort there is a team melting down over interpersonal issues. At times we have seen:

- Students who enroll for the course but have overcommitted to other curricular or extracurricular activities.
- Students who lose interest when they find out their initial idea is not supported by beneficiary interest.
- Teams who can't agree on the level of effort to be made by each team member.
- Other team tensions.

It is the teaching team's responsibility to help, but not solve, the teams' problems. The teaching team can help them diagnose issues and facilitate solutions. At times, all it takes is a conversation about roles, expectations, and desired outcomes from the class. If the problem is more serious, make sure you document all conversations.

Intellectual Property / Open Source Policy

Sharing

We remind students that a key element of Hacking for Defense is that *we get smarter collectively*. We learn from each other—from other teams in class as well as from teams in previous classes. They will learn by seeing how previous classes solved the same type of problem by looking at their slides, notes, and blogs.

This means that as part of the class, the teams will be sharing their Beneficiary Discovery journey: the narrative of how their mission model evolved as they got out of the building, the details of the beneficiaries they talked to and their Minimum Viable Products (MVPs). They means they will their presentations and Mission Model Canvas, blogs, and slides with their peers and the public. On a case by case basis, you may mutually agree to accommodate the interests of problem sponsors with some effort to sanitize presentations or restrict public access to certain materials. The key to avoiding any issues is to be open and transparent in setting expectations ahead of time with the problem sponsor.

(We say this and put it in the syllabus, yet invariably after each class there's a team asking us to take down their final presentation because their sponsor organization or investors think they are "giving away too much.")

Intellectual Property

All intellectual property developed during the class (code, hardware, concepts, MVPs, prototypes, etc.) are open source – with the following caveats:

- Individual team members own whatever intellectual property (patents, hardware, algorithms, etc.) they brought to class with them
- The university may have licensing claims on prior university sponsored research

Manufacturing Assistance for Hardware MVPs

Through NextFlex, a public-private consortium of companies, academic institutions, nonprofits and governments with a mission to advance US manufacturing and we worked with the DIUX to provide a funding mechanism that would allow Problem Sponsors to provide financial support to team prototyping efforts. NextFlex combined that funding with its workforce development efforts to provide additional manufacturing assistance to Hacking for Defense teams. at no cost See Appendix J.

Security Protocols

It is best that sponsor work out how the student's research and class reporting requirements will reflect information that may be sensitive to the sponsor's organization i.e., removing names of interviewees from any document published to the web or filmed in the classroom. Sponsors should work closely with the teaching team and the student team to establish acceptable standards that do not violate the spirit of the class or hinder the student team's research. **Students and university teaching teams cannot sign** security agreements and under NO circumstances can they work with classified information during the conduct of the course. In some cases students that maintain the appropriate clearances may be invited to continue to work on the sponsor problem AFTER the course and not in their capacity as a student.

ITAR/Export Control Compliance

At Stanford, we coordinate closely with the University's Director of Export Control Compliance to insure our course activities are in compliance with all appropriate requirements and guidelines governing Export Control. Teaching teams need to make contact with their own University's equivalent office and ensure their student teams' activities remain in compliance with all ITAR/Export Control requirements. Each university needs to ensure that they do not violate ITAR/Export Controls.

Assembling the Teaching Team

With no more than 8 teams, a single instructor a part-time teaching assistant and one DoD/IC sponsor per team is all that is needed to teach this class. However, the optimal teaching team would have:

- Two instructors
- One local mentor per team
- Advisors
- Military Liaison(s)

Faculty

On its surface, the class could be taught by anyone. The pedagogy of teaching Hacking for Defense using the Lean Launchpad methodology (Mission Model Canvas, Beneficiary Development and Agile Engineering) does not appear overly complex, and with a flipped classroom the students seem to be doing all the work. And on its surface, working with the government just seems to be another market. All an instructor must do is critique and grade their weekly presentations.

However, when teaching this class, the *quality and insights the instructors bring to the critiques* of the team's weekly progress is the core of the class. If you've had startup (not just general business) expertise or experience working with the military and intelligence community, then the critiques you offer to your students draw from the many painful lessons you've learned building businesses or struggling to accomplish challenging missions under demanding conditions. If you haven't had direct startup or DoD/IC experience, you can still do a fine job, just be aware that there may be some old teaching habits to break. In addition, selling to the government and having a first-hand understanding of the needs of specific DOD and IC beneficiaries make the difference between generic advice for a team versus targeted advice based on domain knowledge. Having a member of the teaching team with domain knowledge of the government beneficiaries (but with an appreciation of the Lean Methodology) is a huge asset for your students.

In a perfect world, at least one of the instructors would be an adjunct who has taught the Lean LaunchPad/I-Corps class (or has attended the Lean LaunchPad, I-Corps, or Hacking for Defense Educators Course), and if available, the other would be a local entrepreneur, angel investor or venture capitalist who has experience with the DOD and/or IC. This allows teaching team critiques to be based on specific pattern recognition skills that bring credibility to the teaching team's comments.

While universities have considerable latitude to assemble the best teaching team available, one member of the teaching team must be certified by Hacking for Defense, Inc (H4Di) which entails attending the Hacking for Defense Educators Course in residence or completing the requirements online when available.

Instructor's role

In class, the instructor's role is to:

- Ensure students have watched the online lectures (and present any in-class advance lectures) and answer questions about the lecture subject matter.
- Critique the team presentations and offer guidance on Beneficiary Discovery strategy and tactics. We are [relentlessly direct](#) with the teams. See Appendix B.
- Grade the student presentations and share private comments with the rest of the teaching team via a Google Doc.

Course Assistants

See the separate Course Assistant Handbook in Appendix D for a detailed description of TA's roles and responsibilities

Given all the moving parts of the class, a teaching assistant keeps the trains running on time. Here's what they do:

Pre-class:

- Set up the course web site (use the Stanford H4D template at [www.xxx](#))
- Recruit students by actively and aggressively create demand for the class
- Organize the mixers/information sessions
- Keep the list of DOD/IC problems topics up to date
- Keep track of student applications and match them to DOD/IC topics
- Answer basic questions about the class and application process.
- Ensure teams have set up their blogs and given access to faculty, sponsors & mentors
- Create spreadsheet to track mentors (both military and non-military) for each team (name, email, phone, team assigned, problem set, etc.).
- Work with faculty to formulate expectations of mentors
- Email all mentors & advisors the mentor/advisor handbook, in email include info for the first mentor workshop and the first day of class. Introduce yourself and the teaching team.
- Have mentors watch tutorial video:
<https://www.youtube.com/watch?v=26Y8ZkF1Wk0>

First Day of Class:

- Host Mentor Briefing: Book room day of first class
- Schedule and set up Beneficiary Discovery Workshop - 2-3 hour workshop

During Class:

- Manage and coordinate DOD/IC sponsor/team relationships
- Manage and coordinate local mentor/team relationships
- Manage and coordinate instructor/team office hours

- Collect weekly team presentations and manage the order of presentation and timing
- Ensure the teams blog and manage the Google Docs. This includes:
 - The *instructor grading sheet* used by the teaching team for grading and real-time collaboration for instructors.
 - The *student feedback grading sheet* used by the students to offer feedback to their peers. (Actually designed to keep students *actively engaged in watching* the progress of other teams rather than reading their email.)
 - The Office Hours signup sheet.
- Communicate in-class information to course participants
- Organize the weekly faculty after class “post mortem” meetings

Sponsors, Mentors, Advisors, and Military Liaisons

Each team has a sponsor and a mentor: the DOD/IC sponsor who provided the problem the team is working on and an additional mentor from the local community who understands the DOD/IC problem and beneficiary and/or potential of dual-use of the product. The role of the sponsor and mentor is to help his/her *team test its mission model hypotheses and build matching Minimal Viable Products*.

Role of the DOD/IC Sponsors

Before class each member of the DOD/IC community who contributes a problem to the class has agreed to be actively involved in the class by:

- Providing a detailed topic description and suggested team expertise to solve it
- Pitching their topic (via Video TeleConference (VTC) is ok) for 10-minutes at two prospective student info sessions
 - This is not a requirements pitch but a compelling vignette about the problem and its importance
- Participating in the team interview process
 - Final team selection is made solely by the faculty
- Attending a 1-hour mentor onboarding and orientation session (via Video TeleConference (VTC) or in-person.)
- Provide access to a critical mass of users/stakeholders/partners for interviews (100 when practical)
- Act as an “interview broker” to navigate the “no cold-calls” problem in the IC Community

During class the DOD/IC sponsor is the gateway to Beneficiary Discovery. Cold calling DOD/IC for Beneficiary Discovery is difficult. Most of the DOD/IC are trained not to accept calls/solicitations from “random” people. Additionally, contact information is not often publicly available and students can’t just show up on a base or government agency unannounced and try to interview people. In this class, it is the Sponsors that understand the

problem and know the beneficiaries, stakeholders and their organization and have agreed to facilitate many of the interviews. They have agreed to:

- Provide mentoring and beneficiary access:
 - Brief teams after they've been accepted to the class and help them talk to their first 10 beneficiaries *before* class starts
 - Watch the online video and become familiar with the Lean Startup methodology
 - Mentor the teams via Skype at least 1 hour/week
 - Provide a primary and secondary contact
 - Provide access to 100 users/stakeholders who have the problem for interviews
- 100 beneficiary interviews are an aspirational goal we set for the students – there may be some projects where the total number of users/stakeholders are smaller than that In the first few weeks, the DOD/IC sponsor should *rapidly help teams* to:
 - Gain a deep understanding of the problem through beneficiary discovery
 - Understand how the problem is being solved today (or not) through more beneficiary discovery
 - Understand the solutions already tried and
 - Provide continuous feedback and encouragement on the development of multiple Minimal Viable Product iterations.

It is critical that the sponsor avoids specifically telling students what to do and how to do it. After week four, the DOD/IC sponsors can start turning up the heat with increasingly prescriptive suggestions.

Role of the Mentors

Mentors are an extension of the teaching team responsible for the success or failure of a team.

In this class the local mentor supplements and complements the DOD/IC sponsor. Optimally they add additional perspective about the overall business model, potential dual-use of the product/service, potential commercial off-the-shelf solutions to the problem, additional contacts in other branches of the DOD/IC community for beneficiary discovery. If your school has entrepreneurs who have served in the military or DOD/IC community they'd also make great mentors to bridge the .edu and .mil worlds.

Mentors play an active role in weekly coaching of a specific team. (*Advisors* are on-call resources for the entire class who have committed to respond to student emails/phone calls within 24 hours, but do not have the time to mentor a specific team.)

Recruiting Mentors

While we are recruiting students, we are also looking for mentors. We prefer to have at least one mentor per team.

We keep a spreadsheet of possible mentors and advisors. This class has *no* guest lectures. Getting mentors involved is not about having them come in and tell war stories. Look for

experienced local entrepreneurs and investors who are willing to learn as much as they will teach.

In recruiting mentors, it is important to select individuals with significant intellectual curiosity, relevant experience, and have a generous spirit, and who understand the value of the Mission Model Canvas and Beneficiary Discovery. The right mentor will understand by the end of the class that a Beneficiary Discovery narrative and the Mission Model Canvas are important tools for developing the solutions needed for organizations to achieve their mission.

It is important to set expectations for mentor involvement up front. Successful mentor engagement is at minimum an hour a week and typically 2-3 hours per week throughout the course. Ideally the teams will share their weekly presentations with their mentor the day or evening before the class and get their feedback. After the class, teams share the results of that presentation and their plan for the week ahead. In addition to watching the weekly video lectures and staying current (or ahead) on the readings in the syllabus, the mentors will also want to track and comment on their team's progress periodically in their respective blogs. (See details below.)

What mentors do week-to-week:

- Provide teams with tactical guidance every week (scheduled at the mentor convenience):
- Meet with their team at least 1-hour a week (video Skype or in person)
- Rolodex help: "Why don't you call x? Let me connect you."
- Comment on the team's LaunchPad Central Beneficiary Discovery progress
- Encourage and guide the weekly Minimal Viable Products
- Review the team's weekly presentation before they present.
- Respond to the teaching team's critique of their team.
- Push their team to make 10 - 15 beneficiary contacts/week.
- Stay current (or ahead) of the weekly lectures and readings in the syllabus
- Check in with the teaching team at classes 3 and 7 to discuss student progress.

If mentors can't commit to the time required, have them consider being an advisor.

Advisors

Advisors have the same credentials as mentors, but cannot commit the hour+ a week to a specific team. They've agreed to act as a pooled resource for all teams and will respond to an email within 24 hours. Teams can use them as sources for beneficiary discovery contacts, domain specific questions and questions about the business model.

Mentor/Advisor Weekly Email

After each class, we send mentors a weekly email summarizing what their teams should be doing. The emails are accompanied by a short set of PowerPoint slides summarizing the week's learning for the class. (The weekly mentor update slides can be found in the H4D.org

resource folder. See Appendix D, H4D course assistant guide for an example of an email that would be sent out right after class 2.

Military Liaisons

If your school has any currently serving members of the military, recruit them as *military liaisons*. We've found that the military liaisons help student teams interact effectively with their DOD/IC problem sponsors. The ideal Military Liaison is a mid to senior grade active duty military officer or senior non-commissioned officer with some expertise and/or background in the problem area their student teams are addressing as well as a familiarity with the agency presenting the problem. Reservists and National Guard members also make exceptional Military Liaisons. (see Appendix G in the Sample Syllabus for examples.)

Before class

Military Liaison members are assigned to individual student teams and make contact with the DOD/IC problem sponsor for their assigned student team(s) and reinforces the context and goals for the class. These liaisons help students build the rapport and relationships with the DOD/IC problem sponsors needed for a productive interaction with the student teams.

During the class

Military Liaisons help coordinate and facilitate communication between student teams and their designated DOD/IC sponsor as well as help ensure sufficient access to end users and other stakeholders is available for interviews in support of the beneficiary discovery process. These liaisons are readily available sources of feedback and insight on how to engage a busy DOD/IC "beneficiary" effectively.

The Class Roadmap

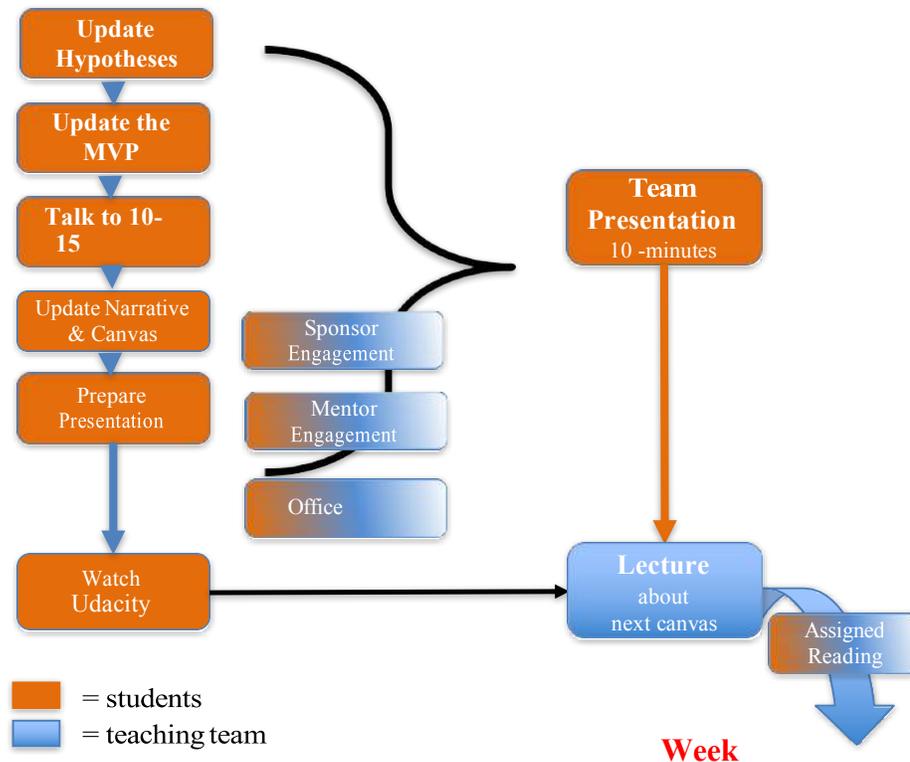
Course Summary

Each week consists of individual team presentations with feedback provided by the teaching team, followed by an advance lecture. Other than the first week, the team presentation will focus on the topic introduced at the previous week's lecture. We conduct two workshops outside of the standard class time to help bring students rapidly up to speed on understanding and working with the DoD/IC.

Week	Team Presentation	Lecture	Topic
Week 1		Workshop 1	Introduction and How to work with the DOD/IC
Week 1	Mission Model Canvas	Lecture 1	Beneficiaries
Week 1		Workshop 2	Beneficiary Development in the DOD/IC
Week 2	Beneficiaries	Lecture 2	Value Proposition
Week 3	Value Proposition	Lecture 3	Product/Mission Fit, Dual Use
Week 4	Product/Mission Fit & Dual Use	Lecture 4	Mission Achievement
Week 5	Mission Achievement	Lecture 5	Buy-in & Support
Week 6	Buy-in & Support	Lecture 6	Deployment
Week 7	Deployment	Lecture 7	Activities, Resources, & Key Partners
Week 8	Activities, Resources & partners	Lecture 8	Mission/Budget Cost
Week 9	Mission/Budget Cost	Lecture 9	Reflections
Week 10	Lessons Learned	Lessons Learned	Final Lessons Learned Presentation

Weekly Class Flow

Each week's class is organized around students' hypothesis-testing their mission model assumptions *outside the classroom*.



They accomplish this by:

- Updating their mission model hypotheses with what they learned outside the building
- Design an experiment (a MVP) to test a specific Mission Model hypothesis
- Talking to 10-15 beneficiaries
- Capturing their beneficiary discovery progress in a WordPress Blog
- Updating their Mission Model Canvas
- Taking what they learned and assembling a 10-minute Lessons Learned presentation.
- Engaging with their mentors.
- Attending mandatory office hours.
- Watching the course video lecture for the upcoming week and preparing questions for class discussion.
- Listening to comments and suggestions from the teaching team on the lessons learned.

In class Activities:

In addition to the students work outside the building the following in-class activities happen every week:

- Class Q&A about what happened during the past week's Beneficiary Discovery.
- Team presentations and instructor critiques.
- Advance Lecture. Teaching team introduces the Mission Model Canvas building block covered in the following week's lesson and prepares the students for what is expected in their next team presentation.
- [optional] After the presentations, have the teams pair up (assigned on a rotating basis) and meet with each other for 10 minutes
 - Swap techniques, tricks, offer each other suggestions

Guidelines for Team Presentations

Each team is expected to speak to 10 or more beneficiaries every week. In every cohort, there is almost always one team that, in either week one or week two, has only interviewed 4 or 5 beneficiaries. When that happens, we ask them to sit down and won't let them present. The reasoning is that they could not have learned very much, and we don't want them to waste the class's time presenting "faith-based" slides in an "evidence-based" class. The 10-minute weekly team presentations are summaries of each team's findings during that week.

Each week, teams are expected to have an updated version of their Mission Model Canvas. **Their beneficiary discovery and MVP should focus on the topic introduced at the end of the previous class.** This is true regardless of whether they've pivoted and are re-exploring topics from earlier lectures. In the case of a pivot (which can be indicative of successful beneficiary discovery), teams have to work doubly hard to cover earlier class topics, update and amend their canvas assumptions as required, and touch on current class topics in their weekly presentation.

You want all team members to be familiar with their entire presentation. One way of doing so is to have the TA randomly select which team member presents.

Format for the Weekly Lessons Learned Presentation

Each team is expected to speak to 10 or more beneficiaries every week. In every cohort, there is almost always one team that, in either week one or week two, has only interviewed 4 or 5 beneficiaries. When that happens, we ask them to sit down and don't let them present. The reasoning is that they could not have learned very much, and we don't want them to waste the class's time presenting "faith-based" slides in an "evidence-based" class. The 10-minute weekly team presentations are summaries of each team's findings during that week.

Each week, teams are expected to have an updated version of their Business Model Canvas. **Their beneficiary discovery should focus on the topic introduced at the end of the previous class.** This is true regardless of whether they've pivoted and are re-exploring topics from

earlier lectures. In the case of a pivot (which can be indicative of successful beneficiary discovery), teams have to work doubly hard to cover earlier class topics, update and amend their canvas assumptions as required, and touch on current class topics in their weekly presentation.

You want all team members to be familiar with their entire presentation. One way of doing so is to let the teams decide which team member presents—half the time. The other half the time, the teaching team selects who presents.

- Slide 1** • Team name, team members/roles
- Title Slide** • Number of beneficiaries spoken to this week
- Total number spoken to far during the class
- Three sentence description what the team does and **why I should care**
- Slide 2** • Show us your MVP of the week
- MVP** • Tell us what hypothesis the MVP is testing, what data you expected and what you actually received
- Slide 3** • Tell us about your 10 beneficiary interviews.
- Beneficiary** *Hypothesis:* Here's What we Thought
- Discovery** *Experiments:* Here's What we Did
- Results:* Here's What we Found
- Action:* Here's What we Are Going to Do Next
- Slide 4:** • Updated Mission Model Canvas and value proposition canvases with
- Mission** week-to-week **changes shown in red**
- Model** • Multi-sided markets shown in different colors
- Canvas**
- Slide 5:** Diagram what you learned this week (e.g., beneficiary workflow, payment
- Diagram** flows, deployment pictorial)

Feedback from the teaching team during the student presentations is where the most teaching occurs. Due to the pace and tempo of the course, participants must be held accountable for the material for each specific class.

To capture the teaching team feedback, we suggest to the teams that they designate one person on the team to *take notes* during their presentations.

Team Blogs

One of the problems with managing multiple teams is that it is difficult to keep track of their beneficiary discovery progress while maintaining a high level of instructor-to-team engagement. Without some way of keeping detailed track of all teams' progress during the week, your in-class critiques would only be based on their 10-minute presentations.

To solve this problem, we insist that each team blog their Beneficiary Discovery progress. We have them write a narrative each week of beneficiaries they've talked to, hypotheses they've tested, results they've found, photos or videos of their meetings, and changes in their Mission Model Canvas. We have them do it all online. Each team creates a blog in Wordpress with access given to the teaching team.

(Note: In the DOD environment we do not post identifying information of Agency employees or military members on any artifact that is posted and shared.)

Blogging allows the teaching team to comment on each team's posts and follow their progress between class sessions. This means that between each class session, the teaching team needs to go online and *read and comment on each of the teams*. Then, when each team presents, your comments and critiques will be informed by their progress

Blog Content

Each teams WordPress blog captures the:

- Interviewee name, position, contact information
- 2-4 bullet points of Key Insights/A-Ha Moments
- List of Hypotheses addressed by the interview + comment as to whether interview data Validates/Invalidates each Hypothesis
- Photos, diagrams, MVPs shown, etc.
- The teams also document their conversations with their sponsor and mentors

Minimum Viable Product Deliverables

Teams are accountable for the following deliverables:

- Teams building a physical product must show a costed bill of materials and a prototype, which could be a rough mock-up
- Teams building a Web product need to build the site, create demand, and have beneficiaries using it.

Course Length: 10-Week Quarter or Semester

The Hacking for Defense Course can be offered in a block week (5 days), in a quarter (10 weeks) or in a semester (12 weeks). Each of these iterations have proven to be successful formats, For the sake of convenience and cogency, the balance of this instructor's guide provides detailed guidance for the quarter (10 weeks) format; however, we encourage you to experiment and adopt it to suit your requirements.

10 Week Course Logistics

- *Brown-bag lunches* and *Info sessions/mixers* prior to the class for team formation. (See appendix x for details)
- Immediately after teams are admitted to class (weeks before class start) teams begin brainstorming solution development and come to class with a first MVP
- The class is offered once a week. Given the experiential nature of the class, it is sometimes listed as a “Lab.”
- Each class is 3 hours long.
- There are nine weekly lectures, plus the final team Lesson Learned presentations.
- The class is *easily configurable from anywhere from 8-12 weeks* by allowing extra weeks after Lecture 3, Beneficiary Segments, for the teams to further explore product-mission fit.
- Three workshops are offered outside of normal class hours for Beneficiary Discovery practice, details on beneficiary acquisition and activation, and presentation skills training. If time permits, they may be offered as normal classes.

Teaching Team Roles and Tools

Team Teaching

In class, the instructor's role is to:

- Ensure students have watched the online lectures.
- Critique the team presentations and offer guidance on:
 - Beneficiary Discovery strategy and tactics
 - Insights on overall Mission Model
 - Team focus on learning about deployment not just building demos
- Grade the student presentations and share private comments with the rest of the teaching team.

Outside class, the instructor's role is to:

- Every week, review and comment on each team's Beneficiary Discovery blog.
- Every week, hold mandatory office hours for every team.

Best Teaching Practices

- Use critiques of specific teams to make a general point for the entire class.
- We use a philosophy of being “[relentlessly direct](#)” with the teams.
 - To some this sounds harsh, but it is the best way to get effective learning in the shortest amount of time. See Appendix F
- Don't offer students prescriptive advice. Instead, try to *teach students to see the patterns* without giving them answers.
- Adjuncts offering startup “war stories” - as well as teaching team members that are military veterans and have actual war stories - should have a *specific* lesson for the class.
- Remember that everything you hear from students are hypotheses—guesses—that you want them to turn into facts. “*That’s an interesting theory. What experiments can you quickly and inexpensively conduct to prove or disprove this theory?*”
- The goal is to get students to extract learning from the beneficiary interactions.
- Numbers of beneficiary visits matter. The larger the quantity, the greater the likelihood for meaningful “pattern recognition” to emerge, and the more extracted insights that can be gained as a result.

Lean Process

- **Focus on discovery + MVPs + Deployment + Validation** (teams find it easy to do discovery, and have found it difficult to build prototypes and validate them).
- Make it clear from the beginning of class that MVPs and validation are required.
- Ensure someone on each team knows how to build MVP, and is doing discovery up and down the chain of command.

Lecturing in the “Flipped Classroom”

Lectures take the students through each of the Mission Model Canvas components while teaching them the basics of Beneficiary Development. Lectures come in two parts; first, the basic lectures have been put online at H4Di.org to “flip the classroom” and are assigned as homework. Second, instructors follow up those basic lectures with in-class advanced lectures (also on H4Di.org) translating the canonical business model canvas into the *mission* model canvas that better maps into DOD/IC problems.

However, we have found that unless you call students out on whether they watched the lectures *in the first class*, most students will *not* watch them. Cold-call students and ask them to describe the lecture. If they can’t we ask them to leave the classroom go watch the lecture and decide if they want to return. You only have to do this once. No one wants to be that student next week.

Note that a flipped classroom still requires class discussion time to integrate the lectures. Reserve at least 10 minutes of instructor-led discussion at the beginning of the class.

Reserve *another* 10 minutes at the end of each class for time to conduct the “looking ahead to next week” discussion, tying both lessons to the teams’ Canvases.

Office Hours

In addition to reviewing each of the teams' progress via their blog, the teaching team has mandatory office hours for teams every week. Office hours help to provide course corrections and uncover the inevitable team dynamics issues. Depending on the size of the teaching team and the number of student teams, you may cycle through one-third to all the teams each week. Office hours help to provide course corrections and uncover the inevitable team dynamics issues.

- Instructors reserve an hour a week to meet with 3 teams for 20 minutes each
- The office hours do not have to be done in person. Video TeleConference, etc. are acceptable alternatives that can include the entire team (from more than one location).
- Office hours ensure that teams don’t get too far “off course.” Indications that an early intervention may be required include: no clue about what a value proposition OR beneficiary looks like; impractical sense of what can be done in the semester in terms of creating an MVP or prototype, early warnings of team dysfunction, etc.
- We recommended that office hours be scheduled at least two weeks in advance, (our TAs use a shared Google doc visible to all) so that the teaching team can prepare specifically for that team’s session.
- Teams are expected to post a summary of the Office Hours on their blog narrative. These should be reviewed and commented on to be sure that you and the teams were actually in the same meeting! (You’d be surprised ...)

Textbooks and Online Video Lectures

There are four required textbooks for this course:

- *Business Model Generation*: Osterwalder and Pigneur, 2010
- *Value Proposition Design*: Osterwalder and Pigneur 2014
- *The Startup Owner's Manual*: Blank and Dorf, 2012
- *Talking to Humans*: Constable & Rimalovski

Our Hacking for Defense textbook will be out in print in time for fall 2017 classes.

- Online videos can be found in the H4Di.org resource folder
- Lecture slides can be found in the H4Di.org resource folder
- Student presentation examples: <http://www.slideshare.net/sblank/>
- Beneficiary Discovery tutorials: <http://venturewell.org/i-corps/llpvideos/>

Grading

The course is team-based and 85% of the grade will come from evaluation of team progress and the final “lessons learned” presentation. The grading criteria are as follows:

- 10% **Individual participation:** consists of four parts: a) quality of the written feedback of students’ peer-to-peer comments provided throughout the semester, during class presentations, b) attendance at each class, c) timely viewing of ALL course videos viewed (those that fall far behind will be asked to **leave the class** and return when they are caught up) and d) a grade from their fellow team members at the end of the course (in the form of a private email sent by each team member to the teaching team assessing the relative participation of other team members’ performance and productivity throughout the semester).
- 40% **Out-of-the-building beneficiary discovery progress:** as measured *each week* by a) quality of weekly blog write-ups and b) canvas updates and presentations. All team members are expected to perform interviews and contribute to the weekly blog entries.
- 25% **The team weekly “lessons learned” presentation:** Team members must:
State how many interviews were conducted that week (include on cover slide).
1) Present detail on what the team did that week, including changes to canvas.
2) Follow the assigned topics to be covered each week as outlined in the syllabus.
3) Team members will be called on randomly to present their team’s findings that week.
- 25% The teams’ **final Lessons Learned presentation and video**

Instructor Pre-Course Reading

To prepare for the Hacking for Defense class you should understand the Lean Methodology. You should be comfortable and conversant with the:

Class Logistics

- Role of your Course Assistant
- Role of your Mentors/Advisors
- Role of your Sponsor

Lean Methodology

- Mission Model Canvas (MMC)
- Value Proposition Canvas
- Beneficiary Development
- Agile Development

Course Assistant Guide

We've written a roles and responsibility guide for the Course Assistant (some schools call them Teaching Assistants) in Appendix D. Review it and edit it to fit your class.

Mentor/Advisor Guide

We've written a roles and responsibility guide for the Mentors and Advisors that support your team in Appendix E. Review it and edit it to fit your class.

Sponsor Guide

We've written a roles and responsibility guide for the Sponsors that provided the problem for your team in Appendix F. Review it and be familiar with expectations of all parties for the first class.

Student Prototyping Support Plan

NextFlex™ has written a roles and responsibility guide for getting students hardware MVPs built for them. See Appendix J.

Overview of the Lean Method

If you know all of this, skip this section. However, if you'd like to brush up on the topics here's some background reading. Start with:

Read the Harvard Business Review Article: Why the Lean Startup Changes Everything

<https://hbr.org/2013/05/why-the-lean-start-up-changes-everything>

Read the Hacking for Defense Blog Posts

<https://steveblank.com/2016/01/26/hacking-for-defense-stanford/>

<https://steveblank.com/category/hacking-for-defense/>

Class Textbooks:

- *The Startup Owner's Manual (SOM)* Blank and Dorf
- *The Four Steps to the Epiphany*

Business Models and Value Proposition

Business Model Canvas

The Business Model canvas is one of the three components of the Lean Method. The Mission Model Canvas we use in Hacking for Defense is a derivative. Read about the business model canvas [here](#):

<http://businessmodelgeneration.com/canvas/bmc>

Get an overview of the *Mission Model Canvas*

Once you understand the Business Model Canvas, here's how and why we turned it into the Mission Model Canvas for Hacking for Defense.

<http://steveblank.com/2016/02/23/the-mission-model-canvas-an-adapted-business-model-canvas-for-mission-driven-organizations/>

Review the Value Proposition Canvas

The Value Proposition Canvas is a subset of the Business & Mission Model Canvas. Read about it and download it [here](#):

<http://www.businessmodelgeneration.com/canvas/vpc>

Background on why Alexander Osterwalder designed the Value Proposition canvas [here](#)

<http://businessmodelalchemist.com/blog/2012/08/achieve-product-market-fit-with-our-brand-new-value-proposition-designer.html>

Course Video Lectures:

These are the weekly lectures your students are watching. They describe the business model canvas and talk the students through the core principles of the class. Watch them to know what your students know.

- Online Lectures at H4Di.org resource folder
- You can download the videos for your own use here:
<https://www.udacity.com/wiki/ep245/downloads>

Textbooks:

- *Business Model Generation (BMG)* Osterwalder and Pigneur
- *Value Proposition Design* Osterwalder and Pigneur

Customer Development Videos:

The videos below offer short tutorials in how to practice Customer Discovery. You can find them on vimeo or on VentureWell.org

- <https://vimeo.com/groups/190717>
- <https://vimeo.com/groups/204136>
- <http://venturewell.org/i-corps/llpvideos/>

Textbooks:

- *Talking to Humans*: Constable & Rimalovski
- *The Startup Owner's Manual (SOM)* Blank and Dorf
- *The Four Steps to the Epiphany*, Blank
- *Business Model Design and Value Proposition Design* - Osterwalder

Other Resources

All previous Lean LaunchPad and Hacking for Defense Student presentations here:

<http://www.slideshare.net/sblank/>

The Startup Tools page is a large resource of tools that your student teams may need to build their minimal viable products:

<http://steveblank.com/tools-and-blogs-for-entrepreneurs/>

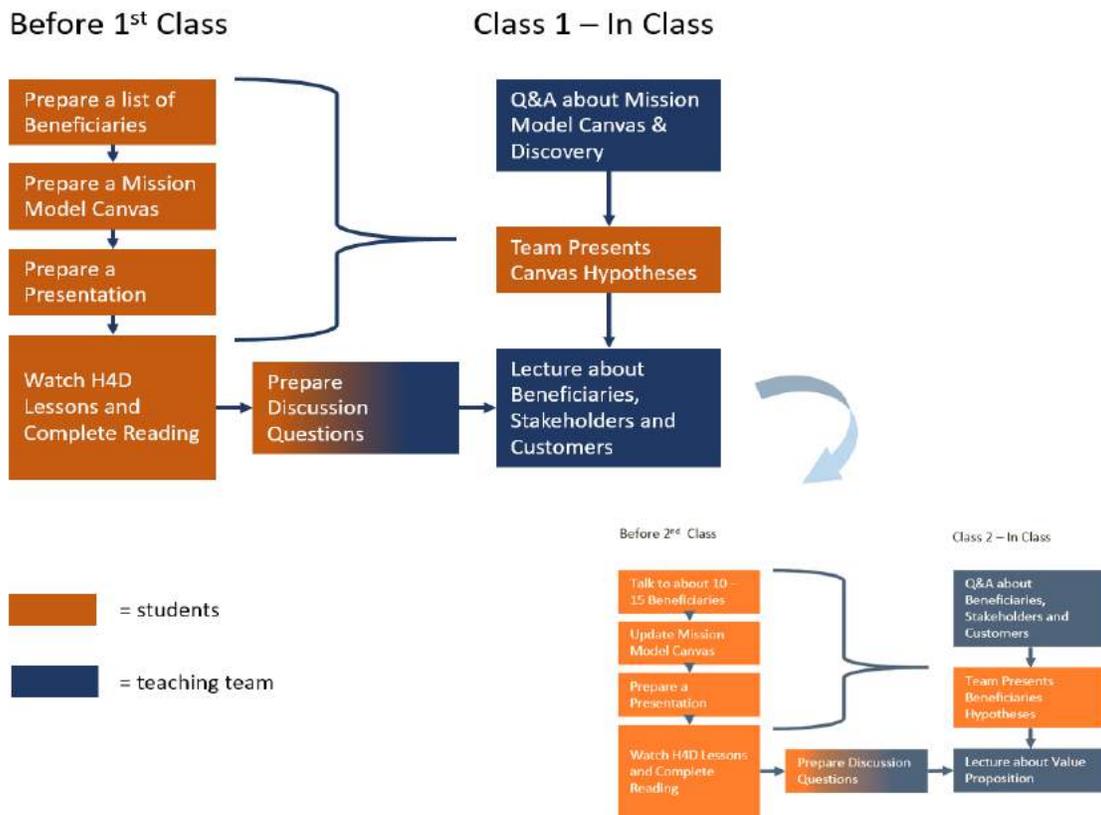
Review the Lean LaunchPad class background:

- <https://steveblank.com/2010/12/07/the-lean-launchpad-%E2%80%93-teaching-entrepreneurship-as-a-management-science/>
- <https://steveblank.com/2011/05/10/the-lean-launchpad-at-stanford-%E2%80%93-the-final-presentations/>
- <https://steveblank.com/2012/02/16/who-dares-wins-the-2nd-annual-international-business-model-competition/>

Detailed Curriculum: Pre-Class Preparation

Detailed Class Curriculum

Student Assignment: Pre-Class Preparation



Teams are expected to hit the ground running. We assume that the teams will come to the first class – and all subsequent classes- prepared by reading the assigned materials, watching the online lectures, and beginning beneficiary discovery before the first class.

We expect students to:

1. Speak to their DOD/IC sponsor
2. Introduce themselves to their local mentor
3. Begin Beneficiary Discovery and complete first 10 beneficiaries before the start of the 1st class
4. Map out the first hypotheses they want to test and develop and present their first MVP on day one of the class

Detailed Curriculum: Pre-Class Preparation

Learning Objectives

Students should prepare to come to the first class able to answer the following questions:

- What is the difference between search and execution?
- What is the Mission Model Canvas?
- What are the 9 components of the Mission Model Canvas?
- What is a hypothesis?
- What do we mean by “experiments”?
- What is Beneficiary Development?
- What are the key tenets of Beneficiary Development?
- What is an experiment?
- What is an MVP?
- What are your first few MVP’s going to be?

Why?

- These are the fundamental principles of the course.
- Having the students prepare on their own time allows instructors to go into full immersion on day one during the first lecture.

How?

- Assign readings and have students complete them before the course begins. Inform students that they are required to know these concepts and that they should be ready to answer questions related to the learning objectives.
- Test student knowledge by having each team prepare the first iteration of their Mission Model Canvas prior to the first class.
 - You should not expect teams to get the Canvas right. You just want them thinking critically about what it means. They will be living with their Canvas for the next few months.
 - Preparing their canvas introduces teams to their cohort and more importantly, it allows the teaching team to assess how adequately they prepared for the course

Student Readings/Viewing for the first class:

Read the Harvard Business Review Article: *Why the Lean Startup Changes Everything*

This article will give the students an overview of the Lean Methodology – Business Models, Customer and Agile Development

<https://hbr.org/2013/05/why-the-lean-start-up-changes-everything/ar/1>

Detailed Curriculum: Pre-Class Preparation

Read the Rationale for the Hacking for Defense class

<https://steveblank.com/2016/01/26/hacking-for-defense-stanford/>

These posts provide the students a week by week summary of the previous class. Suggest to them that if they want to know what to expect in the next 10 weeks start reading from the bottom up.

<https://steveblank.com/category/hacking-for-defense/>

Get an overview of the *Business Model Canvas*

The Business Model canvas is one of the three components of the Lean Method. The Mission Model Canvas we use in Hacking for Defense is a derivative. Have students read about the business model canvas here:

<http://businessmodelgeneration.com/canvas/bmc>

Get an overview of the *Mission Model Canvas*

Once the students understand the Business Model Canvas, have them read the how and why we turned it into the Mission Model Canvas for Hacking for Defense.

<http://steveblank.com/2016/02/23/the-mission-model-canvas-an-adapted-business-model-canvas-for-mission-driven-organizations/>

Read the Blog Post on Minimum Viable Products (MVPs):

Why isn't a MVP just a prototype or a cheaper product? Is one of the harder topics for students (particularly technical ones) to grasp. This article helps.

- <https://steveblank.com/2013/07/22/an-mvp-is-not-a-cheaper-product-its-about-smart-learning/>

Get an overview of Customer Development

Read the 12 Tips for Customer Development Interviews

- <http://giffconstable.com/2012/12/12-tips-for-early-customer-development-interviews-revision-3/>

Read Startup Owner's Manual (SOM):

- pp. 22-30: An Introduction to Customer Development
- pp. 31-50: The Customer Development Manifesto
- pp. 67-68: Overview of Customer Discovery

Detailed Curriculum: Pre-Class Preparation

View Beginners Mindset: <https://vimeo.com/78551898>

Team Presentation for First Class: Mission Model

Each week we have the students present what they learned outside the classroom. For consistency we use a standard presentation format, though we modify it slightly week to week depending on what the learning objectives are for that week. Remind students to refer to the syllabus each week to see what we want in their presentation.

Here's what we want them to present their first time in front of the class.

Slide 1: Title slide

- List the student team members along with sponsor, mentors, military liaisons, and other key members (secure permission from non-student members to be listed by name)
- Number of beneficiaries / stakeholders spoken to this week
- Three sentence description of what the team does and why the sponsor should care.

Live Tactical Threat Toolkit (LTTT)
Surgical-grade EOD, remotely

We seek to create a stream of accurate information and insights for real-time defeat of improvised explosive devices by partner and coalition forces. The device we are building will be network-agnostic and designed for adverse and low-connectivity environments, and will be scalable across levels of information fidelity.

Beneficiaries spoken to this week: 14
Total Beneficiaries: 20

Sponsor: Paul Okey OSD // JIDA

Mentor: Dave Smith Military Liaison: Lt. Col Tirebighter



Andreas Pavlou
Physics/International Security



Nitish Kulkarni
Hardware Engineering



Alex Zaheer
CS
Cyberpolicy



Alex Richard
CS



Gaurav Sharma
GSB

Slide 2.: Show us the team (for week 1 only)

- For Week 1, include a slide about yourselves:
 - Add Photo
 - Your degree Program
 - Your LinkedIn Profile
 - And how your expertise fits this problem.

Live Tactical Threat Toolkit (LTTT) surgical-grade EOD, remotely					
					
	Team Member 1	Nitish Kulkarni	Alex Zaheer	Alex Richard	Gaurav Sharma
Academic Program	MA IPS 2016	ME 2016	CS 2019	CS 2016	GSB MSx
LinkedIn	https://www.linkedin.com/in/andreas-pavlou-02678733	https://www.linkedin.com/in/nitishkulkarni	https://www.linkedin.com/in/alex-zaheer-ba644816	https://www.linkedin.com/company/alexrichard	https://www.linkedin.com/company/gauravsharma@gsb
Subject Matter Expert?	No (Same Software/Prod Mgmt)	No (Sensor Fusion, Systems Integration)	Yes (Software Engineering)	Yes (Software Engineering)	Yes (Military Information Logistics)
Role	Jack of All Trades	Hardware Engineering	SWE	SWE	PM
Experience Solving a Problem that Seemed Impossible	Developing a curriculum for a course on Cybersecurity & International Relations in less than two days.	Developed and designed early stage concepts for multi-million dollar DARPA aerospace and ISD vehicle programs, hypercycles.	Educating newly elderly workforce as a youth regarding "ghost" security practices in many (bank) stores.	Senior in CS at Stanford, specializing in logic.	led a team that built a system to ensure seamless flow of equipment to build rockets for SpaceX in 3 months before everyone said it would take at least twice as long!
					

Detailed Curriculum: Pre-Class Preparation

Slide 3: Beneficiary Discovery

- What hypotheses did you test and how?
- What were the results of that experiment and what do you plan to do with it?
- Tell us about your 10 beneficiary interviews.
 - Hypothesis: Here's What we Thought
 - Experiments: Here's What we Did
 - Results: Here's What we Found
 - Action: Here's What we Are Going to Do Next

Slide 4: Mission Model Canvas (MMC)

- A first draft of the MMC
- Updates to the MMC will be made each subsequent week with **changes shown in red**

Slide 5: Value Proposition Canvas

- Show us a Value Prop canvas for each of the beneficiaries (customers)
- Think about what types of MVPs might be useful to do for you to test some of your hypotheses.

Slide 6: Diagram (as appropriate)

- Diagram what you learned this week (e.g., organization, beneficiary workflow, deployment pictorial)

Point out to the students that examples of other Lesson 1 slide presentations from the Stanford Spring 2016 H4D class are available at this link: <http://bit.ly/2b7BrNO>

Workshop 1: Introduction to the DOD/IC

Workshop 1: Introduction and How to work with the DOD/IC

Week	Team Presentation	Lecture	Topic
Week 1		<i>Workshop 1</i>	Introduction and How to work with the DOD/IC
Week 1	Mission Model Canvas	Lecture 1	Beneficiaries
<i>Week 1</i>		<i>Workshop 2</i>	Beneficiary Development in the DOD/IC

Most students have no idea how the U.S. military is organized or how they buy or deploy products and services. Nor do they understand how they as civilians can interact with them. This goal of this 3-hour workshop is to give students an overview of how the DOD/IC Community is organized, who are the key beneficiaries, what's important to them and how they specify, buy and deploy products.

1. Roles and Missions of the DOD/IC in the U.S.
 - a. Evolving challenges of keeping Americans safe at home and abroad
 - b. Proliferation of Technology and its impact on DoD/IC mission
2. Organization of the DOD/IC
3. How does the DOD/IC specify/acquire/deploy
 - a. Commercial off-the-shelf products
 - b. New technology/systems
4. Exceptions/shortcuts to the process specify/acquire/deploy
 - a. Organizations in DOD/IC that want shortcuts
 - b. DOD/IC incubators, venture firms, innovation outposts e.g. In-Q-Tel, Lab 41, Lab 24, TAOx, DIUx, etc
5. Overview of the types of DOD/IC "Beneficiaries". For example:
 - a. Concept developers
 - b. Requirement writers
 - c. Buyers (Acquisition PM's)
 - d. Users (the tactical folks)

The transcript for the text DoD/IC Workshop is in Appendix I

The full text DoD/IC Workshop with accompanying slides from the H4D Course can be found on the H4Di.org Resources pages.

Class 1: Mission Model Canvas & Customer Development

Class 1: Mission Model Canvas & Customer Development

Week	Team Presentation	Lecture	Topic
Week 1		<i>Workshop 1</i>	Introduction and How to work with the DOD/IC
Week 1	Mission Model Canvas	Lecture 1	Beneficiaries
<i>Week 1</i>		<i>Workshop 2</i>	Beneficiary Development in the DOD/IC
Week 2	Beneficiaries	Lecture 2	Value Proposition

Live Streaming Presentations

Past classes have found that *live streaming* the student team presentations is a valuable for Sponsors, Mentors, and others that want to watch the student presentations but are unable to attend in person. This can be accomplished easily with an iPad or other media device using various software options. Have your Teaching Assistant plan for this if you intend to live stream. This is highly recommended by past teaching team cohorts.

Class and Teaching Team Introduction

- Open the class with a brief lecture reviewing the teaching team, logistics, format, community, time management, and relentless direct style of instruction
 - The instructors have a model that works, is intensive, and will make all of them work extremely hard. It's nothing personal.
 - The program is time consuming, intense and fast-paced.
 - Every class member must learn from and share the collective wisdom and experience of their peers
- Remind them they have to record the beneficiary discovery and insights and decisions each week in their blog. These weekly insights will be a resource to help teams describe their pivots, "Ah-ha" moments, and other consequential experiences in their final end of course presentations. Here they will also note how those insights led them to make a decision or pivot.
- Reminder: Send your mentors your weekly advanced slides, and remind the mentors to stay current on the Course video lectures and readings so they are speaking the same vocabulary as their team

Insights for Team AquaLink



Class 1: Mission Model Canvas & Customer Development

Teaching Objectives:

- *Assess* each team's level of preparation and understanding of the sponsor's problem.
- *Introduce* the Lean Startup Methodology principles
- *Introduce* the Mission Model Canvas (MMC) and Value Proposition Canvas
- *Introduce* Hypotheses, Experiments and Minimum Viable Products
- Advance Lecture: Beneficiaries and Pains and Gains
- "Shock and Awe" immersion in the "relentlessly direct" teaching method.
- *Set* standards for beneficiary discovery and "getting out of the building" to conduct interviews

Key Concepts

Students should leave Week 1 with an understanding of:

- Sponsor and sponsor problem
- Lean Startup Methodology
- The 9 parts of the Mission Model Canvas (MMC)
- Hypothesis
- Experiment
- Minimum Viable Product (MVP)
- Beneficiaries and Pains and Gains

Why?

- The students are solving someone else's problem. They quickly need to deeply understand who the sponsor is, what they do and the sponsor's problem.
- Understanding the Lean Startup Methodology and employing the Mission Model Canvas is the foundation of the course.
- Teaching the students about hypotheses and experiments to test them is the framework for them to put their thoughts about each of the parts of the MMC into words and actions.
- Teaching the students about Minimum Viable Products will help them create cheap and fast tests of their hypotheses, and allow them to perform rigorous experiments.
- Emphasizing the importance of "getting out of the building" doing beneficiary interviews and about the work that is required of them will help students understand the level of commitment that this course requires.
- Presenting at the first class gives students full-immersion on day one, first lecture. It also gives the teaching team the ability to provide remedial help for any team after the first day of class.

Class 1: Mission Model Canvas & Customer Development

How? Have teams start by presenting their five slides as their introduction

- Slide 1
Title Slide**
 - Team name, team members/roles
 - Number of beneficiaries spoken to this week
 - Total number spoken to far during the class
 - Three sentence description what the team does and **why I should care**
- Slide 2
MVP**
 - Show us your MVP of the week
 - Tell us what hypothesis the MVP is testing, what data you expected and what you actually received
- Slide 3
Beneficiary
Discovery**
 - Tell us about your 10 beneficiary interviews.
Hypothesis: Here's What we Thought
Experiments: Here's What we Did
Results: Here's What we Found
Action: Here's What we Are Going to Do Next
- Slide 4:
Mission
Model
Canvas**
 - Updated Mission Model Canvas and value proposition canvases with week-to-week **changes shown in red**
 - Multi-sided markets shown in different colors
- Slide 5:
Diagram**

Diagram what you learned this week (e.g., beneficiary workflow, payment flows, deployment pictorial)
- Slide 6:
Experiments
for next
week**

What hypotheses, experiments and MVPs will they to test to understand beneficiaries

- Students start by hitting the ground running. Instead of intro's they start by presenting their first Mission Model Canvas. They should have talked to 10 or more beneficiaries before class
- Some students will feel uncomfortable presenting before they have had a chance to listen to a lecture. But having the students realize they're responsible for the learning process is *key* and they should be held accountable from day one.
- To emphasize how seriously we take talking to beneficiaries, if a team hasn't talked to a sufficient number of beneficiaries (you get to set how many) we make the team sit down and do not allow them to present. We've found that after that, no team will have that problem again.
- Have the teams start the habit of having one team member take notes of the teaching team critiques
- The teaching team should immediately start critiquing the models and the underlying hypothesis being presented. Praise great examples and do not hesitate to point out weak efforts.

Class 1: Mission Model Canvas & Customer Development

- Press students to explain the problem of their sponsor. The students should already be familiar with their sponsor and the problem they have chosen, as all their efforts in the class will be directed towards solving it. If they don't know or understand what the problem is, the rest of their presentation will just be noise.
- These first critiques should focus on the Beneficiaries, Value Propositions and product-sponsor fit.
- Keep asking the teams to think about initial experiments they can run and research they can do to pass/fail those essential canvas building blocks as early in the process as possible.
- When critiqued some students want to defend their position. There's not enough time in class to do this. Let them know that they can say, "I didn't understand your comment/question. Can you repeat it." Or "I think we did what you asked." And have them explain it again. Or, "thank you, we'll think about how to answer that." Encourage them to grab you at the break or after class if there's an immediate disconnect.
- The initial Mission Model Canvases are almost always deeply flawed. These initial errors give the teaching team the opportunity to help the entire class understand how the canvas should be used. These errors create the opportunity to teach by example!
 - Don't go deep on one team. It's the sum of the comments across all of the teams that is important.
 - When you see a common error, announce, "Class, pay attention. *This is a big idea.* It's one you will all encounter."
- Using the private Google spreadsheet, the teaching team [including the TA] should grade each team. And offer candid impressions of each team's mission model, with emphasis on the most suspect hypothesis.
 - Teaching Team comments are confidential, and are NOT shared with the students.
- While the instructors are critiquing the teams publically, the students offer peer-to-peer input on other team's presentations in real time as they are presented. These comments should be accessible by all students and faculty e.g. on a Google Spreadsheet or other option of sharing.
 - Peer input is an integral component of the grading of each student's grade.
 - Peer input are the questions and insights students would offer in a traditional classroom discussion of a "case". For this class, each "case" would be the team's presentations for the week.
- Push the teams and especially those that do not appear to be sufficiently pushing themselves- the workload will only get heavier later in the course.

Class 1: Mission Model Canvas & Customer Development

Big Ideas to point out as you critique the first class session

- Point out how Hacking for Defense changes the innovation paradigm from “let’s build yet another technology/engineering-centric demo” to a “let’s solve a problem and get the solution deployed at speed.”
 - A team’s technology is just ONE of the many critical pieces necessary to solve a sponsor’s problem. It may enable the Value Proposition and possibly be a Key Resource, but your sponsor does not care about your technology, they are trying to solve a problem.
 - The goal is to create deployable solutions to national security problems.
- The Sponsor’s definition of the problem is not indisputable or static; the problem statement will evolve as students and sponsors interact and jointly learn about it.
 - In many cases the different Beneficiaries /stakeholders within the sponsor organization may have a different view of the problem
- In the DOD there are always multiple Beneficiaries and each Beneficiaries has a unique Value Proposition.
 - The sections of the MMC are interrelated, and significant changes in one almost always trigger changes in another. For example, adding a new Beneficiary is requires adding a new Value Proposition tailored for the unique interests of that beneficiary
- Define hypothesis, minimum feature set, and experiments.
- Explain a Minimum Viable Product- a concise summary of the smallest possible group of features that will work as a stand-alone product while still solving at least the “core” problem and demonstrating the solution’s value. The MVP is:
 - a tool for generating maximum beneficiary learning in the shortest possible time
 - a tactic for cutting back on wasted engineering hours
 - a strategy to get the product into early evangelists’ hands as soon as possible
- Emphasize that an MVP should not be confused with a prototype. MVPs are whatever gets you the most learning about a hypothesis: PowerPoint, wireframe, prototype, etc.
- Push the students for face-face meetings, not just skype.
 - Get them in front of the beneficiary to see, feel and hear the problem.

Class 1: Mission Model Canvas & Customer Development

Common Errors in Week 1

- Lack of understanding of what the sponsor does in their job and weak understanding of the sponsors problem
 - Common for students without a military background. Call them on it and make sure they understand they need to get a deeper understanding.
- Blank sections of the mission model canvas
 - This is a sign that the team didn't do the reading. Call them on it.
 - any hypothesis is better than no attempt
- Listing entire organizations as Beneficiaries- not getting down to user level
 - A Beneficiary has a title, name and job description.
- Identifying Beneficiaries without corresponding Value Propositions (or vice versa)
 - Easy to get wrong and common mistake
- Confusing Value Propositions with Feature Sets
 - Technical teams do this all the time. Use this to introduce them to the Value Prop canvas
- In the Value Prop canvas listing product features under "Gain Creators" and "Pain Relievers"
 - Make them go back through the reading
- Assuming the purpose of this class is to execute, not test and develop, the MMC
 - Often happens when teams think the class in an incubator
- Using Beneficiary Discovery to pitch products
- Pitching their product or solution to their Sponsor's problem to the class instead of focusing on *learning* about the problem / potential solution.
- Not using Beneficiary Discovery to test hypotheses

Guardian: Mission Model Canvas

Key Partners - U.S. Army Asymmetric Warfare Group - Ground forces - Suppliers of radars for small flying objects - Depending on solution: suppliers of system components for detection and counter measures - Commercial drone manufacturers (e.g. DJI) - Suppliers of Do-it-yourself drone kits -FAA	Key Activities Requirements Engineering - Define top three scenarios of deployment - Define performance limitations of current systems System design - System and components engineering Key Resources - Access to relevant ground forces to define relevant scenarios - U.S. Army Asymmetric Warfare Group to define relevant set of capabilities	Value Proposition Countering Drone Threat: - Weaponized drones -Swarm of drones -Drone aided -Reconnaissance	Buy-In/Support - Need buy-in from U.S. Army Asymmetric Warfare Group - Need implementation by ground forces Deployment - Develop a hacking device - Develop a shooting device - Develop a intercepting device	Beneficiaries - Primary: Ground forces operating within approximately 20 miles of adversaries (reach of today's commercial drones) - Secondary: U.S. Army Asymmetric Warfare Group (budget, capability)
Mission Budget/Costs Fixed: - System design & engineering Variable: - Hardware costs		Mission Achievement - Provide affordable and mobile drone protection		

Figure x: Typical Week 1 canvas. Vague and unfocused

Class 1: Mission Model Canvas & Customer Development

Advance Lecture: Beneficiaries/Stakeholders

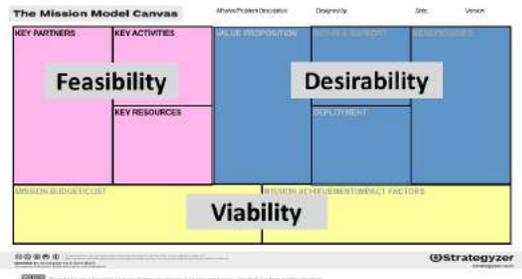
The advanced lecture builds on the assigned reading for this coming week and introduces Beneficiaries/Stakeholders. Access full presentation of “Beneficiaries/ Stakeholders” Advance Lecture at H4Di.org.

Key teaching points:



Beneficiaries in the DoD/IC
H4D Advanced Lecture 1

In the commercial world winners ship products
In the DOD people who win wars *field* products
faster than the other guy



The right side of the canvas makes sure you are building the right thing
The left-side of the canvas makes the right-side possible. It’s the “back-stage” activities.
The bottom makes the top achievable and that’s how problems get solved....



- The most common mistake made is in listing organizations as beneficiaries and trying to draw value propositions from generalizations. If your MMC next week has a bunch of organizations listed as beneficiaries, you are not doing it right. The faster you get specific (x person

of y rank, doing z job) the sooner you will start to derive value added conclusions

- The second most is common mistake is in interviewing too few beneficiaries, then trying to draw specific conclusions (archetype) about them. Talking to one Army Sergeant will allow to draw conclusion about him. Talking to 5 Sergeants in one unit will allow you to draw conclusions about Sergeants in that unit. Talking to 15 Sergeants from across the Army who are involved in route clearances missions will allow you to draw conclusions about Army Sergeants who perform route clearance missions
-

Class 1: Mission Model Canvas & Customer Development

In the commercial world winners ship products

In the DOD people who win wars field products faster than the other guy

Today it doesn't matter how good your equipment is when you show up for a fight. If you don't win on day one, the winner will be the one that learns to change the fastest.

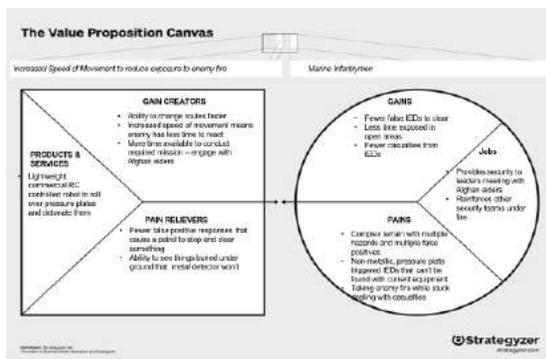
Key Take-away #1:



The Problem with Users (Beneficiaries)

- Users (beneficiaries) seldom know what they want until they see it. You won't have an honest conversation about what a problem is until you put a potential solution in their hands. You absolutely must have a hypothesis and use an MVP to help drive the discussion.

- Your beneficiaries will have conflicting opinions about the problem and potential solutions. Just because they appear to have the same job does not mean they go about it the same way. You must complete a VPC for each in order to capture these potential conflicts. Don't be afraid to use the VPC from one interview in another in order to validate or clarify what your beneficiary is telling you. A major mistake is in talking to two few beneficiaries, then trying to draw a conclusion from them.



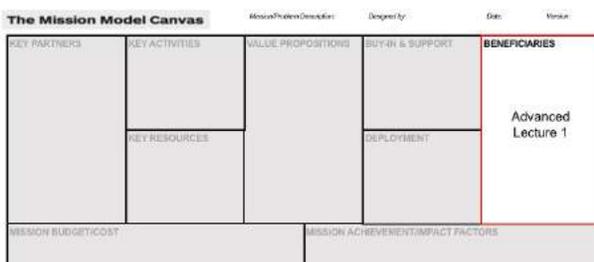
Key Takeaway #2:

The value proposition canvas works – use it!

- You have to prep for your interview ahead of time. Filling out a value proposition canvas based on what you THINK are the answers you will get, is a useful tool in helping you emphasize with your beneficiary prior to the interview. Ask probing questions to clarify that what you think is either right, wrong or incomplete.

Be prepared to be wildly wrong. This isn't the time to defend what you think or defend what a different user said. Use disparity as an opportunity to ask more questions

- Don't mistake a product or service for a value proposition. Answer the questions: "What does it look like when there is no pain?" What are you able to do that you couldn't before?



Key Take-away #3 – Get specific

v6.3

Class 1: Mission Model Canvas & Customer Development

- A Marine Infantryman is not the same as an Army Infantryman, and neither are the same as an explosive ordnance disposal (EOD) team member, yet all share some common jobs and traits on the battlefield when it comes to dealing with IEDs on the battlefield. You need to strive for diversity in your interviews to insure you understand the entire problem and how it fits in their pattern of life
- A common mistake amongst teams is to list a bunch of organizations in the beneficiaries column early in their discovery work, then try to reflect general VPC's about them based on just a couple interviews. Talking to more people will help you gain the depth you need to get more accurate feedback.
- The more interviews you do, the better your questions will become. Don't be afraid to go back and re-interview someone once you realize your original questions were not well formed

Key Take-away #4: Finding 10-15 people a week with value added knowledge is hard

Questions to ask to expand your network

- What operating concept is this problem related to (why is this a problem) and who authored the concept?
- If you can't share the concept with me because it is classified or the distribution is limited, can you explain a commercial concept that is similar?
- Who is/are the capability manager(s) that will eventually write a requirement for the solution we might come up with?
- What engineering development centers, national labs etc. are doing research into the technology associated with the gap this problem falls in?
- Who is/are the Acquisition Program Manager(s) who will eventually buy the solution?
- Who will use a solution to this problem? If I can't access them directly do you know of anyone with a similar problem in the commercial world?

- These are questions you should ask at every interview to help you broaden your ecosystem of interview subjects. Ask for names, roles, contact information introductions etc. Make it easy for your interview subjects to do outreach for you by giving them a standard paragraph on your efforts that they can send to others.

Don't be afraid to look for analogous environment. For example, in a previous class when a team could not get responses to the questions they were asking about adversarial social media tracking related to ISIS because the answers were classified, the team switched to looking at adversarial media in the public realm. Not surprisingly the US presidential race provided them with exceptional examples which allowed them to engage their beneficiaries with the same type of questions.

Class 1: Mission Model Canvas & Customer Development

Readings for next week: Beneficiaries

- Read SOM pp. 85-- 92: Customer Segments, Types, and Archetypes
- Read SOM pp. 203- 211: Problem Understanding
- Read SOM pp. 218- 219, 222- 224: Problem Understanding, Market Knowledge
- Use from SOM pp. 476- 477: Customer Segment Checklist (Create H4D Specific if possible)
- Video: Watch new Online Lesson: Beneficiaries and Interview Practices
- Video: Watch Online Lesson 2 (re-shoot if possible)
- Read VPD pp. 7-25 Value Proposition Definition and Customer Profile

Team Presentation for Class 2: Beneficiaries

Slide 1: Title/Intro Slide

- Continue to update the interview counts and your problem description.

Slide 2: Beneficiary Discovery

Customer Discovery			
Hypotheses	Experiments	Results	Actions
<p>DARPA is a potential customer and we should target them.</p> <p>What Hypotheses are you testing?</p>	<p>Interviews with DARPA PMs, research</p> <p>How have you tested it?</p>	<p>Validated. A number of interviewees is trying to start a program in COTS direction. We are looking for use cases for our technology for 10-31 and 10-31 and 10-31.</p> <p>What did you Learn?</p>	<p>Talk to the PMs for the offices that could be interested in our project.</p> <p>What will you do next week?</p>
<p>DARPA acquisitions are made by the PMs.</p>	<p>Interviews with DARPA PMs, research</p>	<p>Partly validated. The PMs for the office make the initial decisions. It's important to meet with the PMs before applying to increase chances of being selected. If they give a thumbs up, they then pitch it up the DARPA chain. The level of needed approval depends on the amount of money.</p>	<p>Meet with PMs for the offices and demo our technology, to help them select our product and pitch it to the Deputy Director of DARPA.</p>
<p>We could find labelled training data and a CV expert before July</p>	<p>Interviews with CV Lab, Movidius, research</p>	<p>Validated. CV Lab and AFRL have offered to provide labelled training data that we could use. CV Lab may get us a student to work on our problem. The processing may take more than 50 hours.</p>	<p>Get and process the labelled data.</p> <p>Get student with low hourly rate so as to not blow our budget</p>

Keep your beneficiary discovery organized and focused

- Listing Hypotheses you will test during customer discovery will help your team stay focused and deliberate.
- There are probably many interesting directions your team could explore, but it should be done systematically to ensure you do not become distracted or spend too much time exploring something tangential.
- Listing how you tested the Hypotheses ensures that the results are based on qualified and substantiated evidence and the actions section helps focus the team for next week.

Class 1: Mission Model Canvas & Customer Development

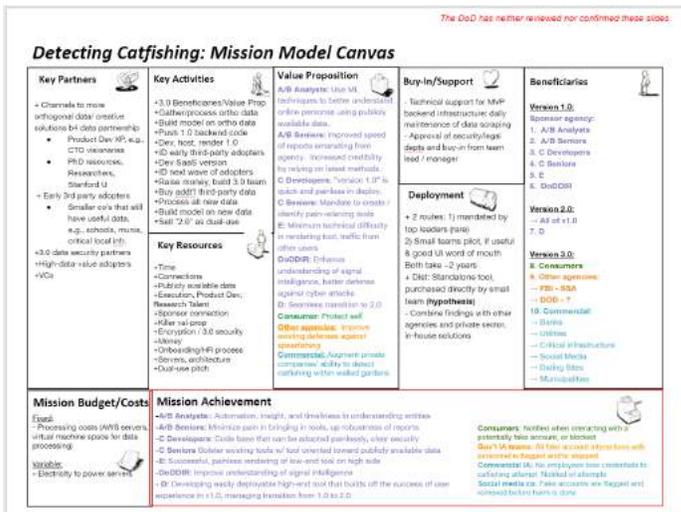
Slide 3: Beneficiary Discovery Proof



Show Pictures of your “out of the building experience”

- Great beneficiary discovery requires that you get out of the building. You will learn so much more by meeting people in person in the environment the problem exists than you ever will over the phone.
- We understand that this is not entirely possible for teams whose sponsors are not local. Look for an analogous local group that you can work with – ask your sponsor to help you. For instance, the team shown here was working with Navy SEALs stationed in Hawaii, but they were able to visit local Para-rescue-men to discuss and experience much of the same equipment and pains.

Slide 4: Mission Model Canvas

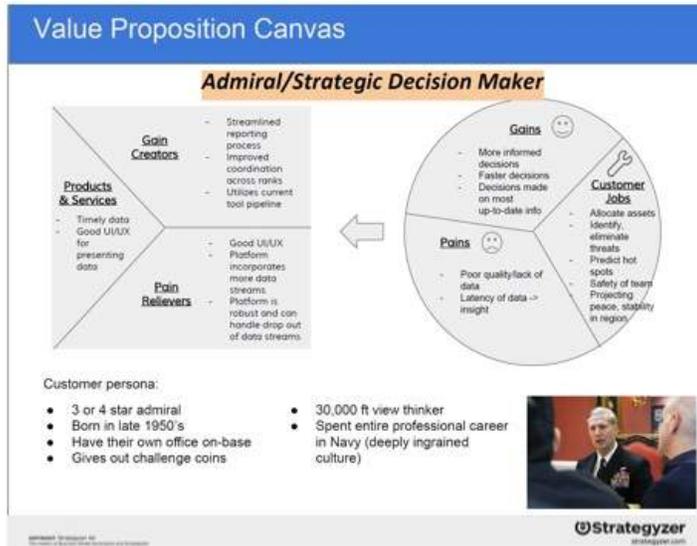


Managing information on the Mission Model Canvas

- Color code and associate value prop with beneficiaries
- Mark your weekly changes in red
- Get specific
- Note that Beneficiaries are *not entire organizations*.

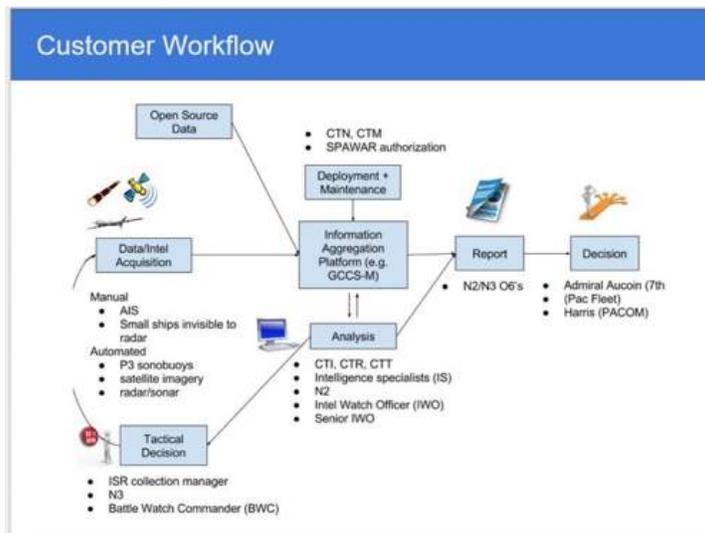
Class 1: Mission Model Canvas & Customer Development

Slide 5: Value Proposition Canvases* + Beneficiary Archetypes*



- Ensure you have a unique VPC for every beneficiary
- Do one VPC for each beneficiary and prep them ahead of time
- Use the VPC and your notes to help you build a Archetype to describe the beneficiary.
- You will do this a lot....get used to it.
- What is the job of this beneficiary?
- What are the pain points in his/her job?
- What gains does he/she want?

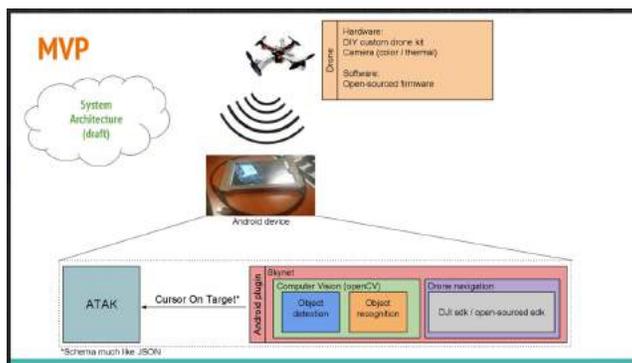
Slide 6: Beneficiary Workflow



Class 1: Mission Model Canvas & Customer Development

- Each beneficiary will also have a job-specific workflow – map it!
- Within an organization, any of these workflows will be interconnected.
- You must understand both the individual workflows and how those workflows interact with each other.
- Down the road this will help your team understand who you will need to support or advocate for you and who may be your saboteurs/roadblocks.
- Continue to refine this over the course of the quarter.

Slide 7: MVP (+ Experiments conducted)



Build MVPs not DEMOS

- This is not a demo making class. We do not want elaborate full featured prototypes. These are often un-deployable and rarely meet the needs of the user.
- Instead you will make Minimum Viable Products.
- Often these will take the form of an idea represented by a diagram or a quickly physical MVP.
- The goal is to test your understanding of the beneficiaries Pains and Gains.
- Creating a MVP will help your team quickly and inexpensively root out misunderstandings.

Workshop 2: Beneficiary Development in the DOD/IC

Week	Team Presentation	Lecture	Topic
Week 1	Mission Model Canvas	Lecture 1	Beneficiaries
<i>Week 1</i>		<i>Workshop 2</i>	Beneficiary Development in the DOD/IC
Week 2	Beneficiaries	Lecture 2	Value Proposition

Talking to people you don't know is hard. Figuring out how to get them to talk is even harder. And knowing what to get them to talk about is an art.

This workshop will cover the basics of Beneficiary Discovery.

The Beneficiary Discovery portion of the workshop will consist of Lecture and Team Role Playing based on the *Talking to Humans* textbook:

Lecture

- Overview of the 4 types of DOD/IC "Beneficiaries". Examples include:
 - Concept developers
 - Requirement writers
 - Buyers (Acquisition PM's)
 - Users (the tactical folks)
 - Other beneficiaries as applicable by agency
- How to understand each of these beneficiary problems,
- How to understand each solve the problem currently

Team Role Play

- each team describes their preparation for Beneficiary Discovery
- each team role play a beneficiary interaction with another team
- teams critiques each other
- Teaching team offers "best practice" suggestions

What's a Minimal Viable Product in the DOD/IC

Engineering-driven teams sometimes find it confusing to understand the difference between a prototype and a *Minimal Viable Product*.

Our definition of a Minimal Viable Product is whatever gets the team the maximum amount of learning at that point of the class. It may be a wireframe, Excel spreadsheet showing data, PowerPoint slides, physical mockup, etc. The MVP will change week-to-week and as more is learned about users/stakeholders, etc. will become more refined as the class progresses.

The workshop will illustrate best practices for MVPs.

Class 2: Beneficiaries

Class 2: Beneficiaries

Week	Team Presentation	Lecture	Topic
Week 1	Mission Model Canvas	Lecture 1	Mission Model Canvas, Beneficiary Development
Week 2	Beneficiaries	Lecture 2	Value Proposition
Week 3	Value Proposition	Lecture 3	Product-Mission Fit, Dual Use

Class Introduction

- Open the class with an observation about a specific teams Beneficiary Discovery interview you read about in their blog
 - This lets the students know you're reading their blogs
 - Remind them their blog is how the teaching team keeps up with their progress
- Then ask, "Anyone else have an interesting Beneficiary Discovery encounter?"
- Cold call on a student and ask them to describe the assigned reading and/or video
 - Find one who hasn't done it. Remind the class that next week you'll ask them to leave and go do their homework
- BTW, we noticed that teams picked the most articulate team members to give the weekly Lessons Learned presentation. And while that makes sense for a fund raising pitch, it's the wrong model for a classroom – we want everyone to learn how to present. So each week we select a different team member to lead their team presentation. This means that even students whose first language isn't English are up in front of the class presenting at least twice during the quarter.

Teaching Objectives:

- *Continue to set expectations for Beneficiary Discovery*
- *Set expectations for documenting Beneficiary Discovery*
- *Review Beneficiaries and Pain and Gains*
- *Prepare students to complete Value Proposition Canvases*
- *Explain the relationship between the Value Proposition, Value Proposition Canvas and Minimum Viable Products*
- *Introduce Pain Relievers and Gain Creators*
- *Prepare students to complete Beneficiaries Archetypes*

Class 2: Beneficiaries

Key Concepts:

Students should leave Week 2 with an understanding of:

- Beneficiary Discovery
- Beneficiary
- Beneficiary Archetype
- Product-Mission Fit
- Value Proposition
- Value Proposition Canvas

Why?

- Civilians with limited experience working with the DoD/IC, don't know the types of problems these organizations face. Nor have they worked with the beneficiaries attempting to solve them.
 - Through Beneficiary Discovery students will identify the different beneficiaries and their specific archetypes.
 - This requires students to “*get outside the building*” and interview as many beneficiaries as they can to gather insights into the crux of the problem, as well as the underlying motives, pains and gains.
- The value proposition canvas helps students refine their understanding of each beneficiaries pain and gains.
 - And understand that in the DOD/IC there are always multiple beneficiaries
- What they're looking for is that fit between the beneficiaries and the solution in the form of a value proposition –“problem/sponsor fit.”

How? Have the teams start by presenting

- | | |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slide 1
Title Slide | <ul style="list-style-type: none">● Team name, team members/roles, # of beneficiaries week/total● Three sentence description what the team does (update as needed) |
| Slide 2
Beneficiary
Discovery | <ul style="list-style-type: none">● Tell us about your 10 beneficiary interviews.
<i>Hypothesis:</i> Here's What we Thought
<i>Experiments:</i> Here's What we Did
<i>Results:</i> Here's What we Found
<i>Action:</i> Here's What we Are Going to Do Next |
| Slide 3
Beneficiary
Discovery | <ul style="list-style-type: none">● Beneficiary Discovery pictures & videos (or it didn't happen) |
| Slide 4: Mission
Model Canvas | <ul style="list-style-type: none">● Updated Mission Model Canvas show changes shown in red● Multi-sided markets shown in different colors |
| Slide 5: Value
Proposition Canvas | <ul style="list-style-type: none">● What is the job of this beneficiary?● What are the pain points in his/her job?● What gains does he/she want? |

Class 2: Beneficiaries

- **Beneficiary Archetype/Persona for each beneficiary**
 - Show how the beneficiaries are interrelated
 - diagram out your beneficiary's day-to-day workflow
 - Show us your MVP of the week
 - Tell us what hypothesis the MVP is testing, what data you expected and what you actually received
 - What hypotheses, experiments and MVPs will they to test to understand beneficiaries
- Slide 6: Diagram Beneficiary flow**
- Slide 2 MVP**
- Slide 6: Experiments for next week**

- This week teaching team should focus its feedback on beneficiary discovery, Beneficiaries and the right half of students' Value Proposition Canvases.
- Beneficiary Discovery is about quantity, speed, and **insight**. Students tend to default to a journalistic narrative of reporting: "Here's what I saw, and here's more of what I saw," versus an entrepreneur's narrative: "Here's what I saw, and here's what it means."
 - This is hard because we're not giving them much time to think, but it's the insights, the pattern recognition on the data they are collecting that will make them successful
 - Press students about insights "What does it mean?"
- From past experience we know that the teams that perform the best are the teams that conduct the most interviews.
 - Make the point clearly to the class *that Beneficiary Discovery is their primary activity*.
 - Tell them that we know discovery is hard, and harder in the DOD/IC.
 - the teaching team is there to help. If they're stuck they need to "blow the whistle" way before the next class meeting time.
 - For you as an instructor, finding your own style to effectively "push your students" might be the hardest part of the class.
 - **If you can't do this, you've lost the class.**
- You'd be surprised what the students are capable of. Entrepreneurs are expected to accomplish more than is humanly possible with less than is humanly conceivable. Teaching that lesson starts here.
- Teams may become stymied or frustrated when their access to information and data is limited because it's classified. When this happens have them brainstorm with the sponsor about finding proxies– the equivalent problems, hardware or data in the commercial sector. When the team has developed a deep understanding of the problem these proxies become obvious.
- That said, teams should have spoken to *at least 10 beneficiaries* since the last class and you should not accept anything less than 5, especially in the critical first weeks
 - We call out any team that did not talk to more than 5 beneficiaries (you can set the number). We remind that expectations were made clear in the first class and. Consider the following response to the first team that presents based on evidence from fewer than 5 beneficiary discovery interviews:

Class 2: Beneficiaries

- Stop their presentation, and ask them if anyone was ill, or if they were traveling to see beneficiaries, or if they had asked anyone on the teaching team for help in reaching beneficiaries. (Check to make sure they don't have a valid excuse.)
- *Politely* ask them to leave the classroom to make phone calls. Tell them if they have something to add before the rest of the presentations are over, they can present.
- If leaving the room to make calls is not a possibility (due to time of day, etc.) they should not be given more time to present.
 - i. Point out that the goal of the class isn't how smart they are or what demos they can build, but what they learn outside the building. Without data we're just hearing their opinion.
 - ii. Offer that 5 interview is barely one beneficiary interview per team member."
- **To reiterate, our experience is that if you can't do this, you've lost the class.**
- This is the class session where you remind teams that while online surveys tools, while potentially providing data, DO NOT COUNT toward their weekly beneficiary discovery interview quotas.
 - a. One-on-one Skype calls are ok. But there's nothing as effective as in-person, where teams can explore the unexplored, pick up visual cues from the surroundings, and
 - Remind teams that if they haven't put the interview in their blog it doesn't count
 - a. They should update their blog soon after their interviews as possible
 - b. Waiting to update Discovery until just before class means they won't get comments from other team members not at that interview, their mentor, the faculty, and the more likely it is that fewer details will be captured and shared.
 - c. While a team is presenting, refer to an interview detail from their blog to show you have read it
- Make sure students articulate hypotheses about what they will learn via Beneficiary Discovery each week. Formalizing their hypothesis enables students to take the structured approach of (1) Hypothesize, (2) Experiment, (3) Results, (4) Action.
- Continue to be relentlessly Direct when providing feedback and addressing student errors.
- Encourage teams to challenge prior assumptions and hypotheses. A team who says "what were we thinking?" about their previous MMC should be congratulated. It results from an honest reflection on feedback they have received and their willingness to admit they were wrong.

Class 2: Beneficiaries

Big Ideas to point out as you critique this class 2 session

- This week the students are still trying to get a handle on what exactly the sponsor problem means
 - If they haven't been in the military, they're trying to rapidly figure out chain of command and all the beneficiaries between the problem and solution
 - This is why discovery is important
 - This is why they need to quickly be generating lots of value proposition canvases, one for each type of beneficiary they discover
 - Rarely appropriate are organizations as beneficiaries. While organizations can have value propositions, they are not monolithic and are composed of personnel with diverse and divergent interests
- Many students will be confused by what constitutes a Beneficiary, and will likely list large swaths of people or entire organizations as Beneficiaries.
 - To deliver a product/service to a single beneficiary you need to understand everyone in the hierarchy who can help or hurt that deployment Point out that Beneficiaries are actually much more granular than that, they have a name and a title. They share common goals and problems.
 - That in the DOD they are multiple Beneficiaries for each problem and most have different motivations which lead to unique/different Value Propositions.
 - encourage students to get off campus to meaningfully interact with Beneficiaries and experience their Sponsor's problem firsthand (if possible). They'd be surprised what cool places they'll get invited to visit and toys they'll get to see.
 - The concept of a *Beneficiary Archetype* helps students understand their Beneficiaries in much greater detail (name, rank, organization, location, role, etc.) and provides teams a tool to check whether they know enough about the Beneficiary.
- Teams need a *Value Proposition Canvas* (VPC) for each beneficiary. The teaching team should focus on the right half of the VPC since it deals exclusively with the Beneficiaries (next week's focus is on the Value Proposition, the left half).
 - Make sure they understand the role of Gains, Pains and Beneficiary Jobs in the Value Proposition Canvas
 - Often the teams' VPCs are filled with guesses for pains and gains because they haven't talked to enough people. It's a great time to point out that one data point is not sufficient evidence to draw a conclusion
 - Remind them that refining the VPC is done by building Minimum Viable Products (MVPs) testing with beneficiaries.

Class 2: Beneficiaries

- Encourage students to look for differences between their beneficiaries (using the VPC). They should try to understand why different beneficiaries on the “same team” would say different, potentially conflicting things.
- Introduce the Beneficiary Pyramid as a means to demonstrate and graphically represent that beneficiaries can have different – even opposing – value propositions.
- To start, students should be able to draw (or acquire) an organization chart of where the sponsor sits. But what we really want them to do is to draw an internal a diagram of how their Beneficiaries interact with one another to solve/work the sponsor problem. This is not an organization chart. What we want to know is how does the problem get solved/deployed. Who needs to be involved? How?
- Teams need to update each of the 9 Mission Model Canvas boxes weekly.
 - Annotating the Mission Model Canvas can have a domino effect one change can have on other elements of the Canvas. Teams need to be open to changing many, if not all of their initial Mission Model Canvas hypotheses.

Common Errors in Week 2

- Students confuse the value proposition *canvas* (which is a deep dive into the relationship between beneficiaries and their value proposition – sometimes called Product-Mission fit,) with the mission model canvas box labeled “value proposition”
 - This week they should have been focused on beneficiaries on the right-side of the value proposition *canvas*. They needed to understand pains, gains and jobs to be done.
- One of the hardest things for smart people to do (other than beneficiary discovery) is to “listen” rather than “talk.” We find that one of the most common errors is that teams pitch their slides or MVPs as solutions to be “sold” to their Beneficiaries.
 - Selling is a warning sign that the team has likely not done (or understood) their assigned reading.
 - Cold call them and ask them to describe the difference between an MVP and a prototype. Ask them if they’ve done the reading.
- Often teams start by listing organizations as a Beneficiary. Help them understand that there is a lot more granularity.
 - Or they may have the opposite problem, listing tons of random Beneficiaries
- Often they’ll get vague data from the interview and you’ll see this as fuzzy Beneficiary pains and gains.
 - Often this because they didn’t make enough beneficiary discovery calls.
 - Or they didn’t articulate experiments to test their hypotheses.
 - Or they didn’t set up pass/fail tests for each hypothesis.

Class 2: Beneficiaries

- Or they didn't spend time trying to derive insight from the data.

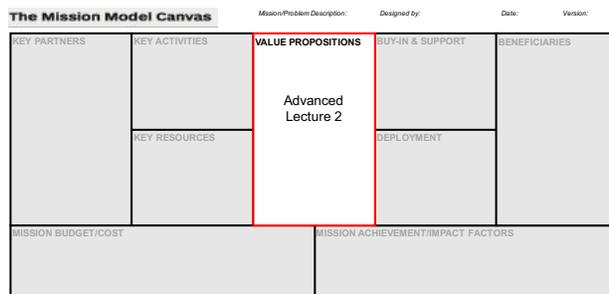
Advanced Lecture: Value Proposition

The advanced lecture builds on the assigned reading for this coming week and introduces the Value Proposition. Access full presentation of "Beneficiaries/ Stakeholders" Advance Lecture at H4Di.org.



Value Proposition Canvas
H4D Advanced Lecture 2

To deliver a product/service to a single beneficiary you need to understand everyone in the hierarchy who can help or hurt that deployment. Each of those beneficiaries has a value proposition.



- The most common mistake made with value propositions is making broad generalizations about value without asking enough questions of enough people. Remember, this is a journey. The more questions you ask the better directions you will get.

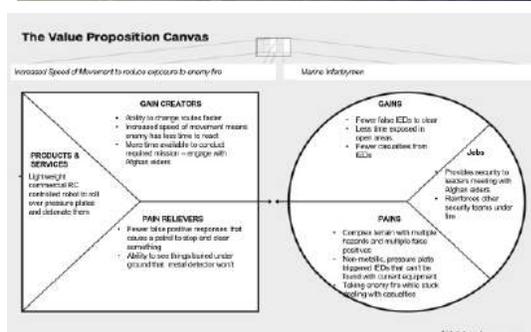
● The second most common mistake is confusing a set of features as a value proposition. It's the effect the features of a product have on a work flow that count, not the features.



Present the 3:30 MRAP Valve Stem Guard video at:

<https://youtu.be/hzGGNyMjvvgg?t=10s>

Watch this video and try to listen carefully to each of the people talking. See if you can't figure out what the pain and gains are for the sergeant and capture your notes on a Value Proposition Canvas.



Once you've completed your VPC based on what you heard, compare notes with those around you.

Class 2: Beneficiaries

Did everything you captured come from the sergeant himself or did you learn other things by listening the other speakers?

Did you understand everything they said? If not did you capture acronyms and terms you didn't understand so that you could ask about them later or get help from a mentor understanding them?

How many beneficiaries did you identify? Can you think of others?

What's the Value Proposition?

- To the sergeant? *Use the VPC on the next slide and work through a group response*
- To the mechanics?
- To the base commander?
- To Exponent (the lab guy)?
- To the vehicle program manager

In addition to what the Sergeant had to say, can you identify any other people who might be beneficiaries of the solution? Think up the chain of command, what would the next higher level above them gain from this solution? What about the organization that was doing the prototyping, what is their Value Proposition for being in Afghanistan doing the work to begin with? Why would they want to help the Sergeant? What about the vehicle manufacturer? Are they a beneficiary of the solution or could they be a saboteur?

Key takeaways from this exercise:

- You have to listen carefully to what people have to say in order to understand them. Sometimes its best to do interviews in pairs, with one person responsible for asking questions and interacting with the beneficiary and another taking notes and only asking clarifying questions at the end.
- Even when its not obvious, there will likely be other beneficiaries, this is why it is important to map work flows of each beneficiary
- Saboteurs lurk in the shadows. If you are working on a problem it may be because someone elected not to fix it. You need to ask the question

Class 2: Beneficiaries

Readings for next week: Value Proposition

- Read SOM pp. 76- 84: Value Proposition Hypothesis
- Read Osterwalder, Value Proposition Canvas:
<http://businessmodelalchemist.com/blog/2012/08/achieve-product-market-fit-with-our-brand-new-value-proposition-designer.html>
- Read Autonomow: <http://steveblank.com/2014/10/03/mystudentsgrowintoa-company/>
 - Lean Launchpad Case Study
- “Commercial Eyes in Space,” Air War College Paper:
http://www.au.af.mil/au/awc/awcgate/cst/bh_bell.pdf
 - DoD Case Study
- Read VPD: pp. 26- 63 Value Map, Fit

Team Presentation for Class 3: Value Proposition

Slide 1: Title/Intro Slide

- Continue to update the interview counts and your problem description.

Slide 2: Beneficiary Discovery

- What hypotheses did you test and how?
- What were the results of that experiment and what do you plan to do with it?

Slide 3: Beneficiary Discovery (Slide showing how your team did Beneficiary Discovery. PICTURES + Videos

- Visit your sponsor
- Get hands-on with their problem

Customer Discovery Experiments

Hypotheses	Experiments	Results	Action
Data aggregation + layering is secondary to sensor availability	<ul style="list-style-type: none"> - Site visit @ NPS (CMDR Breuer, CAPT Verheul, Higgins, Brutzman, Miller) - Interview with Ostrander (U of Hawaii) - NYTimes article 	<ul style="list-style-type: none"> - Extremely keen on solving sharing and aggregation problem - "GCCS is susceptible to garbage-in, garbage-out" 	<ul style="list-style-type: none"> - Visit a CG version of a MOC - Speak with Palantir about their products - Evaluate recommended data fusion products such as Pacific Disaster Center
This is a 7th Fleet problem	<ul style="list-style-type: none"> - Engagement with Knudson - Site visit @ NPS - Interview with LT. COL Oti 	<ul style="list-style-type: none"> - This is a PACOM problem; 7th Fleet was tasked with finding a solution - This impacts not only J2 and J3, but also J5 (planning) 	<ul style="list-style-type: none"> - Speak with PACOM J2, J3, J5
N2/J2 are our ultimate beneficiaries	<ul style="list-style-type: none"> - Site visit @ NPS - Engagement with Chu - Interview with Oti 	<ul style="list-style-type: none"> - A data aggregation and layering platform would benefit a lot of organizations - N/J3 is the key organization; N/J2 and N/J6 support N/J3 - Also impacts work of N/J5 	<ul style="list-style-type: none"> - Interview with Deputy N3 TONIGHT - Speak with N/J3, N/J5



Class 2: Beneficiaries

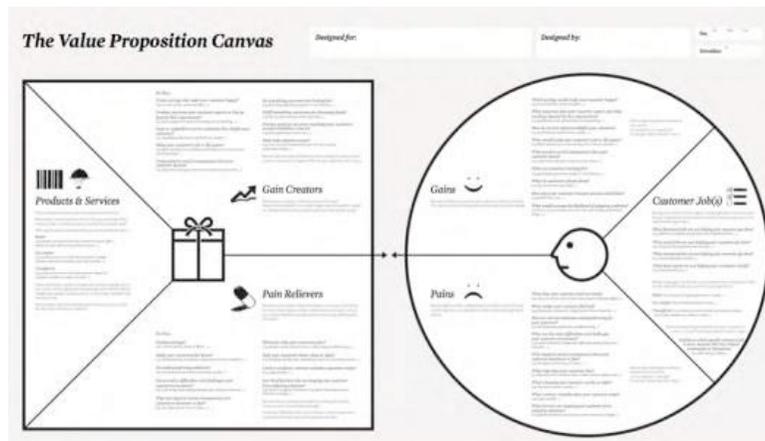
Slide 4: Mission Model Canvas

- Color code and associate Value Propositions with Beneficiaries
- Note that Beneficiaries are *not entire organizations*.

Mission Model Canvas			
KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	BUY-IN / SUPPORT
SOCOM: Provide funds NextFlex: Materials Supplier Stanford PRLAOCRC: Enable manufacturing and Testing Problem sponsors: Navy Special Warfare Group 3 (NSWG-3), U.S. Special Operations Command (SOCOM) Course Faculty and Staff, DIUX, Military Liaisons:	Conduct Customer Discovery Outreach to key partners Design and Manufacture MVPs Test MVPs for functionality and with customers Obtain approval by Navy KEY RESOURCES Finance Funds for MVP creation Supply Chain Resources for Manufacturing Physical Manufacturing Facilities, Testing Facilities Human Adaptors for Guidance on Process, Military Expertise, Operator Knowledge Network of support to enable process.	NSWG Provide greater situational awareness for SDVT-1 with a mechanism for the SDV to obtain absolute location and comms while staying underwater and minimizing exposure. Research Entities Provide a periodic check in from equipment placed in the field. Commercial Divers and Fishing Enable the location of assets. Tourism Divers Find lost tourists or have an automatic location check in.	Who: SDV/SEAL Divers How: Commodore of NSWG-3 approves if long-term external funding is not needed, otherwise Commander of NSW needs to approve DEPLOYMENT FOLLOW THE PROCESS: <ul style="list-style-type: none"> SDVT-1/NSWG-3/NSW CDR create ODR N8 drafts CDD J4 will select office to lead the charge N8/Ops field test, third-party labs certify J8 creates official requirements N4 approves funding
MISSION BUDGET <ul style="list-style-type: none"> Hardware/software prototyping costs (RDT&E from SOCOM) Purchase of existing products on the market for evaluation (NSWG-3 or NAVSOC N-8). 		MISSION ACHIEVEMENT FACTORS <ol style="list-style-type: none"> Feasibility: At the end of the quarter, SDVT-1/NSWG-3 decide that our proposal merits further development and initiates their internal processes for funding/pilot testing/field deployment i.e. creating the ODR Performance: Our prototype should demonstrate that all critical features can be integrated within given size/weight/cost specs User satisfaction: Seamless integration into current SOP, increased situational awareness Increase Mission Capabilities: Reduce the time it would take for the diver to get a GPS fix 500% increase in efficiency. 	
		BENEFICIARIES End Users (Divers) Influencers NSWG-3 Decision Makers NSWG-3 Research Entities Commercial Divers Fishing Tourism	

Slide 5: Value Proposition Canvases + Beneficiary Archetype (one per Beneficiary)

- What pain points does your solution solve?
- What gains does your solution add for this beneficiary?
- What is your proposed product/service that addresses all of this?
- Updated Beneficiary Archetype/Persona for each beneficiary



Class 2: Beneficiaries

Slide 6: Beneficiary Workflow

- Show your expanded understanding of your beneficiaries workflow
- At the outset of your presentation we want to hear about your biggest insights of the week.
- For the rest of the presentation you can point to the insight and show us how it drove change in the MMC and in your understanding of the sponsor and their problem.
- The evidence to support this insight will be in the Beneficiary Discovery Table like the one you produced for this today's class
- Show how the beneficiaries are interrelated

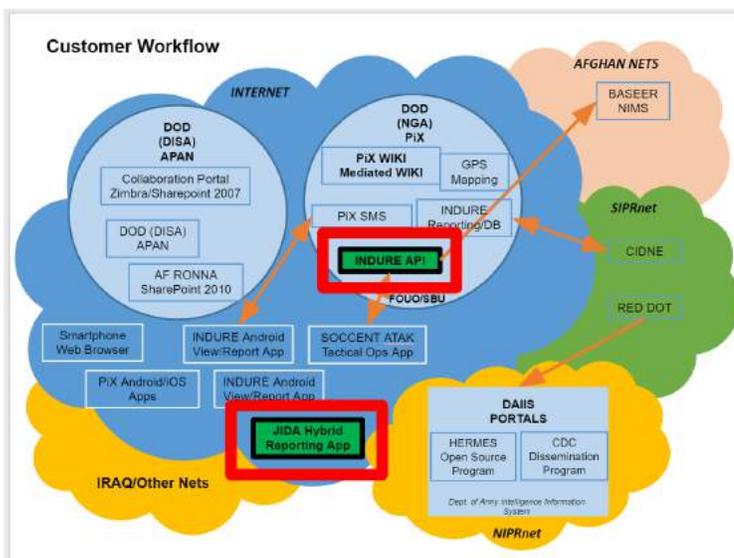
Customer Archetype



- Male, age 21-32
- Competitive, driven, physically fit, **mentally resilient**
- Volunteers to join the Navy; spends 2-4 years training
- Volunteers to become a Navy SEAL; spends 1.5-2 years training
- Volunteers to join SDV; spends an additional 3-6 months training
- Driven by **problem solving** and **technical mastery**
- Not naturally focused on the long-term health impacts
- Highly specialized; **constant pursuit of optimization**

Team AquaLink

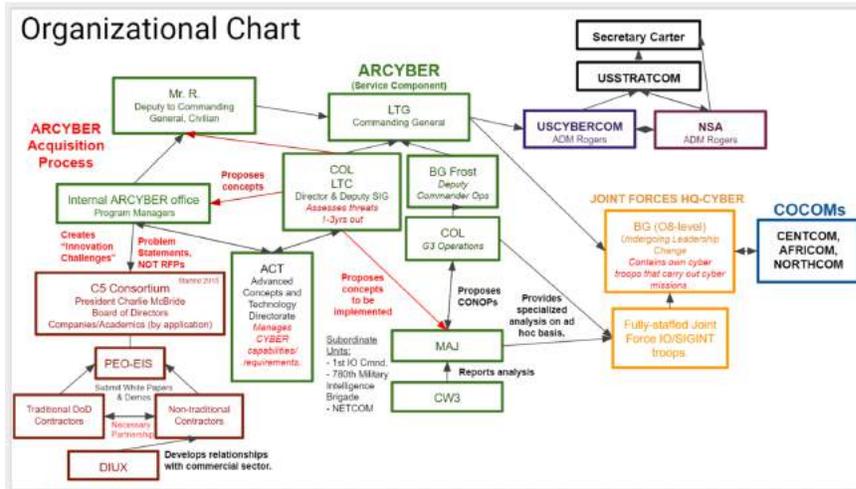
- An important part of the beneficiary discovery process is understanding the beneficiary workflow. Diagram out your beneficiary's day-to-day workflow.



- Continue to refine this over the course of the quarter

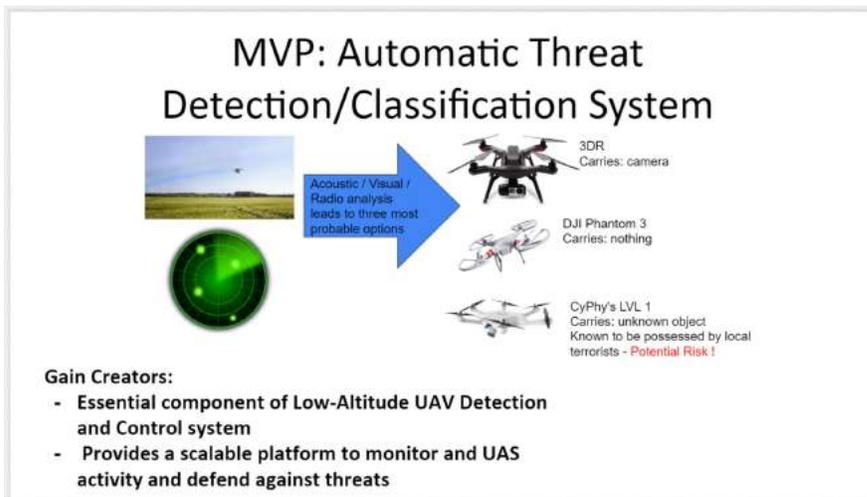
Class 2: Beneficiaries

Big idea. Notice that the organizational chart is not the same thing as the workflow!



Slide 7: MVP (+ Experiments conducted)

- MVP is a tool to test your hypotheses about your MMC; it is not necessarily your product. The idea is to use the MVP to test your understanding of the problem and your value proposition.



Class 3: Value Propositions

Class 3: Value Proposition

Week	Team Presentation	Lecture	Topic
Week 2	Beneficiaries	Lecture 2	Value Proposition
Week 3	Value Proposition	Lecture 3	Product-Mission Fit, Dual Use
Week 4	Product-Mission Fit & Dual Use	Lecture 4	Mission Achievement

Class Introduction

This is not a typical class The class is a combination of theory and intensive practice. First and foremost, it is experiential and hands-on. The teams live and die by the Lean Startup credo: “There are no facts inside the building so get the hell outside.” That’s why, by the end of the class, teams will talk to 800 beneficiaries (users, program managers, stakeholders, etc.)

The Lean Methodology requires teams to abandon their preconceived notions of how one builds startups and solve problems – The class is designed to break students out of that all too common mindset that they understand customer’s problems, can design a solution and want to get right to work on building it – all without contact with the stakeholders, users, decision makers, etc.

After decades of teaching we have found that getting students to really change these beliefs cannot be done with reading, case studies or in-class simulations – at least not in the short time we have them in the class. If we really want them to understand how to efficiently and rapidly understand and solve customer problems, we needed to immerse them with customers on day one.

And if we want them to understand what life outside the classroom in an early stage venture will look like, then they need to experience chaos, conflicting data, uncertainty and good-enough decision making for 10 confusing weeks.

We start by pushing the teams incredibly hard to set the pace (and wash out any of those who can’t work at this pace.) Teams hit the class running. Before the first class, each team has already spoken to 10 customers, and they are challenged to present their mission model canvases within 20 minutes of walking through the classroom door. Within 5 minutes from the first time a team starts to present, they get hit with “relentlessly direct” critiques.

But by now (or by week 5) the teams will have either embraced the Lean process or you’re not going to get through to them. So by week 5 in the class we begin to dial down the tone and tenor of the comments, and over the next four weeks become their cheerleaders rather than their taskmasters.

Class 3: Value Propositions

In week 9 we'll stop and use the week and class for "reflection". We've found that getting the teams off the customer discovery treadmill at this point helps them to look back and reflect on what they've really learned, not just about their product/customers but more importantly about the lean processes, themselves, and team work.

- Talk about a team you spoke to in office hours who are confused by the conflicting and confusing information they're getting (see the "How" section).
- Make an observation about a specific teams Beneficiary Discovery interview you read about in their blog
- Then ask, "Anyone else have an interesting Beneficiary Discovery encounter?"
- Cold call on a student and ask them to describe the assigned reading and/or video

Teaching Objectives:

- *Reinforce* the relationship between the Value Proposition, Value Proposition Canvas and Minimum Viable Products
- *Reinforce* that the Value Proposition exists to solve a beneficiary's problem
- *Emphasize* that Value Propositions have a one-to-one relationship with Beneficiaries
- *Describe* the challenges of Beneficiary Creep
- *Emphasize* use of MVPs to test hypotheses on the MMC and Value Prop Canvas
- *Introduce and Explain* why we look for Product-Mission fit
- *Introduce* the concept of Dual-Use and why the DOD and VC's think it's important

Key Concepts

Students should leave Week 3 with an understanding of:

- Value Proposition
- Pains and Gains
- Pain Relievers and Gain Creators
- Minimum Viable Products
- Product-Mission Fit
- Saboteur
- Dual-Use
- Deployment not Demos

Why?

- Many teams believe a solution to a problem "is all about my technology or a product" Your goal is to teach them that *the goal is deployment not a technology demo*. In some cases, demos may be required to generate the initial Buy In and Support needed to continue down the road to deployment. Demos thus can be a "means to the desired end" – deployment -but must not be the end in itself. That to get a product or service deployed you start with Product-Mission fit and then figure out the rest of the Mission Model Canvas."
- Teaching the students that each beneficiary or stakeholder will need a different Value Proposition will prepare them to realize that the various beneficiaries do not

Class 3: Value Propositions

have the same needs. This will become especially important when the students think about how to get Buy-In and Support from stakeholders later in the course.

- By framing the VPC in terms of Gain Creators and Pain Relievers, we are able to test the effectiveness of potential solutions without being married to any specific one. This abstraction thus enables empirical testing of students' hypotheses through MVPs instead of traditional (very costly) prototypes.
- Teaching the students how to better create testable hypotheses allows them to ask the right questions to gain new insights each week. The hypotheses they test should directly impact their MMC and thus needs to be specific enough not to be a truism. They must know enough about their sponsor and their subsequent Pains and Gains to create MVPs to test their hypothesis.
- Focusing on relieving Pains and creating Gains helps students to focus on creating something their beneficiary actually *needs*

How? Have the teams start by presenting

- | | |
|------------------------------------|-----------------------------------------------------------------------------------------------------|
| Slide 1: Title Slide | • Updated |
| Slide 2 & 3: Cust Discovery | • Discovery Updated, Slide 3 new photos |
| Slide 4: Mission Model Canvas | • Updated changes shown in red |
| Slide 5: Value Prop Canvas | • Multi-sided markets shown in different colors |
| Slide 6: Diagram Beneficiary flow | • Updated to show your proposed value prop/product/service that addresses the beneficiaries |
| Slide 7: MVP | • Show how the beneficiaries are interrelated |
| | • diagram out your beneficiary's day-to-day workflow |
| | • Show us your MVP of the week |
| | • Tell us what hypothesis the MVP is testing, what data you expected and what you actually received |
| Slide 8: Experiments for next week | • What hypotheses, experiments and MVPs will they to test to understand beneficiaries |

- The teams should have spoken to at least 10 beneficiaries since the last class.
- Getting out of the building, for nearly every team, is hard and awkward. However, at some point (usually after the team's first major pivot), the proverbial "ah ha" moment hits, the light bulb goes off, and they can't imagine any other way of learning what they need to do to be successful.
- During today's presentations make sure they teams are explaining **what they learned** not just tell us **what they heard**.
- Make sure they've articulated pain-killers, gain creators, and their idea of what their MVP should be.
 - Praise a team that got it right.

Class 3: Value Propositions

- Use your critiques to drive them to understand what pains their value propositions are solving, what gains they are creating:
 - Which features can do that?
 - What is the MVP required to prove the validity of their value proposition hypotheses?
- Make sure they are articulating their hypotheses—what they expected to learn versus what they found. Without that, it’s just a bunch of random beneficiary interviews. - The “hypothesis - experiment - data - insight” loop is the core process of the class.

Big Ideas to point out as you critique this class session

- Keep asking the teams, “What’s pain remover or gain creator? What features does that?”
- Each beneficiary needs a Value Proposition Canvas. This also ensures that they verify the pains and gains of each group of beneficiaries independently
- Hopefully the students used MVPs to test their value propositions. Remind students: MVPs are the minimum needed to test a hypothesis; they are not prototypes and don’t require physical manifestations. In some situations, a powerpoint slide, wireframe, organizational chart or a written product description would suffice as an MVP.

Common Errors in Week 3

- Students confuse the value proposition *canvas* (which is a deep dive into the relationship between beneficiaries and their value proposition – sometimes called Product-Mission fit,) with the mission model canvas box labeled “value proposition”
 - This week they should have been focused on value proposition on the left-side of the value proposition *canvas*. They needed to understand pain relievers, gain creators and the products and services that provide those to the beneficiary.
 - The Mission Model Canvas box labeled “value proposition” summarizes the product/service for each beneficiary. (the pain relievers and gain creators are on the detailed VPC’s)
- Students confuse the MMC Value Proposition to mean only the product/service features, or list product features under “Gain Creators” and “Pain Relievers”.
 - Value Propositions summarize the entire relationship (pros and cons) that Beneficiaries have with a product.
 - Value Propositions and Beneficiaries must have a one-to-one relationship with a beneficiary described in a VPC
- Classic Beneficiary Discovery errors:
 - Not enough Beneficiary Discovery Interviews.

Class 3: Value Propositions

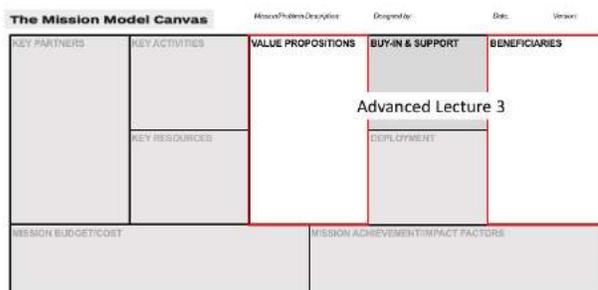
- No hypothesis testing, just demos or product pitches to potential beneficiaries.
- Did not articulate experiments to test their hypotheses.
- Did not articulate pass/fail tests for each hypothesis.
- Vague data from the calls.
- Little to no insight derived from the data.
- Insufficient quality for Beneficiary Discovery interviews
- Observing instead of interpreting Beneficiary Discovery data
- Using Beneficiary Discovery to pitch products
- Not articulating experiments or pass / fail conditions for hypotheses
- No MVP
- Defining a Beneficiary too broadly (students are unable to create a specific archetype)
- Not color coding MMC to match Beneficiaries.
- Not color coding Value Propositions to match Beneficiaries

Advanced Lecture: Dual-Use and Product-Mission Fit



Product – Mission Fit
H4D Advanced Lecture 3

This lecture will prepare students for validating their *Product-Sponsor Fit*. It will teach students why *dual-use* is an important consideration and inspire them to pursue it for their own products. (See the H4Di.org website for Examples in the Resources folder)



Key points in Advanced Lecture 3

- As you have now discovered there are multiple beneficiaries related to your problem and they have many versions of what the “problem” is. The purpose of the Value Proposition Canvas is to help you wrap your head around the multi-sided market that surrounds them. Product market fit is what you get right when you combine what you learned about the beneficiary’s jobs, pains and gains with what they say are their pain relievers and gain creators.
- There are a number of factors that will get a solution rejected by beneficiaries. You should include these factors in your interview questions and your MVP’s should allow you to test for them.
- It’s at this point that you may begin to see product fit that includes “dual use technologies

Class 3: Value Propositions

Mission + Circumstances + Environment = Needs



A resupply mission in Afghanistan

- The same mission is performed at base all over the country, yet the size of the base, its available infrastructure and how remote it is will determine how acceptable different solutions.
- Radically different environment and circumstances for execution of the mission means that even beneficiaries at the same

level will have different views

- Slide represents a resupply mission for large bases and for small combat outposts.
- Small pictures underneath show the activities required to accomplish the mission. For large bases the mission is supported by large numbers of people and assets and is a very complex operation. While it would seem they would be able to tolerate just about any solution to a problem. The complexity of this environment might actually make it harder for a solution to fit with the activities surrounding it. At the small base, things are simpler, but the processing capacity is much reduced in planning for a complex answer. Things like weight and size, suddenly become very important when your main mode of transportation is your feet.

As you interview your beneficiaries you should ask more clarifying questions about the circumstances of how they might employ a solution and about how that solution might impact other things they do.

- Size – make it too big (or too small)
- Weight – make it too heavy (or not heavy enough)
- Form Fit – make it so it doesn't integrate with their other equipment
- Durability – make it so its fragile (in the conservative estimate of the user)
- Complexity – make it too hard to fit into the user's cognitive ecosystem*
- Speed – Fail to deliver it in a timely manner**

Complexity drives cognitive overload in many forms

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- How many people are available to think through a problem: Multiple people can consume tougher challenges. If there is only a few involved in planning, a multi-step solution may be the straw that breaks the proverbial camels back when it comes to cognitive load
- Are we using computer power to crunch data or brain power (**mapping workflow is critical**)?
- How much data is available data vs how much time a beneficiary has to make a decision – a bad thing if we provide more data to analyze but don't create a means to reduce the time required to do the analysis .
- Peripheral vision vs tunnel vision – with good peripheral vision a beneficiary has more time to react to a change outside their immediate job. If their job or your solution causes hem to have tunnel vision, then reaction times outside that specific job will be greatly reduced. Is this a threat to your beneficiary?

Class 3: Value Propositions

- This will serve as inspiration. Hearing Secretary Perry talk about his experience in entrepreneurship, and then in government and defense, will allow the students to gain perspective and work more intensely in the course.
- “Pivot” Section from Steve Blank’s Week 6 H4D Blog Post
 - <https://steveblank.com/2016/05/12/hacking-for-defense-stanford-week-6/>
- Supplemental: Read Case study on In-Q-Tel and their attempts to align dual-use tech with the right product-market (see Harvard Business Review Case Study).

Team Presentation for Class 4: Dual-Use and Product-Mission Fit

Your requirement for next week is to:

Slide 1: Title Slide

- Continue to update the interview counts and your problem description.

Slide 2: Beneficiary Discovery

- What hypotheses did you test and how?
- What were the results of that experiment and what do you plan to do with it?

Slide 3: Beneficiary Discovery Pictures

Slide 4: Mission Model Canvas

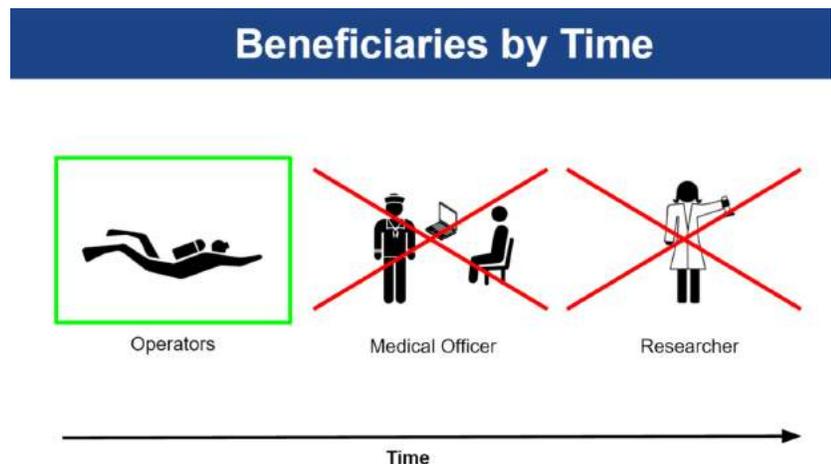
- Update the Mission Model Canvas:
 - Color code and associate value prop with beneficiaries
 - Note that Beneficiaries are *not entire organizations*.

Slide 5: Beneficiaries:

- Capture your weekly beneficiary discovery experience in a chart
- Are they changing over time?

Slide 6: Value Proposition Canvas showing Product/Solution Fit

- What pain points does your solution solve?
- What gains does your solution add for this beneficiary?



Class 3: Value Propositions

- What is your proposed product/service that addresses all of this?
- Updated Beneficiary Archetype/Persona for each beneficiary

Slide 7: Product-Mission Workflow

- Show your expanded understanding of how the pieces fit together

Slide 8: MVP

- Tell us what hypothesis the MVP is testing, what data you expected and what you actually received
- MVP is a tool to test your hypotheses about your MMC; it is not necessarily your product

Pivot or Proceed?		
	Geolocation	Vitals Monitoring
Type of Need	This is the most immediate and active need the most often mentioned pain point.	This is a latent need that the divers are unaware of; and a passive need of the Medical Dive Officers; and an active need of Researchers
Beneficiary	Divers, Dive Officers	Researchers, Dive Officers, Divers, Dep of Navy, VA
Realistic Goal	A work around that will function within specific limitations	A working <u>minimal</u> viable product that ruggedization of off the shelf products and aggregation of sensors
Mission Achievement	Wholesale adoption within SDV, employment throughout broader NSW community; limited commercial opportunities for recreational divers	Adoption within SDV, application throughout NSW, DoD SOF elements, limited application within commercial dive sectors, athletes, etc

Slide 8: Dual-use (optional)

- Show the options that the team explored and their analysis / conclusions as to whether they are good opportunities.

Slide 8: Explain any Pivots that the team has done

- Don't be afraid to pivot!
- If you decide to pivot, or are thinking about it, be sure to explain how and why you are pivoting.

Class 4: Product-Mission Fit, Dual Use

Class 4: Product-Mission Fit, Dual-Use

Week	Team Presentation	Lecture	Topic
Week 3	Value Proposition	Lecture 3	Product-Mission Fit, Dual Use
Week 4	Product-Mission Fit & Dual Use	Lecture 4	Mission Achievement
Week 5	Mission Achievement	Lecture 5	Buy-in & Support

Class Introduction

The teams are about halfway through the class. I usually give them a pep talk about what they've learned, presentation skills, team dynamics and what they need to do going forward. I remind them:

- Your team should now be smarter than everyone in the room about your canvas
- You still might not have Product-Mission Fit, but if you have validated portions of your canvas remind people which portions
 - Do all parts of the canvas make sense together?
- When you're presenting, if you've gotten feedback in office hours
 - Repeat the feedback. "In office hours we heard..."
 - Tell us what you're going to do with the feedback
 - We heard it, but we're going to ignore it (truly ok)
 - We need to think about it for a few days
 - Wow. That was helpful we're going to...
- When you're presenting, stall if you need more time to think on your feet
 - Repeat the question back by saying, "What I think I heard you ask is", and then repeat their question asking for confirmation
 - If you don't know the answer, it's ok to say:
 - That's a great question we need to caucus on the answer. When would you like us to get back to you?
 - Don't be defensive
 - You're a team - Ask your team members for help answering
- When you're presenting, if you actually did what we're asking but we don't get it, Say, "I think we did what you asked for but I'm probably not explaining it correctly."
 - Then try to explain it differently. Ask your team members to help explain it.
 - If we still don't get it try to listen to us and say, "we need to take notes and see if can get you the answer"
- Team problems, there's no shame in interpersonal conflict
 - Bad things happen when you deny it exists and/or don't ask for help
 - Failure Modes:
 - No one loves your initial idea
 - Thinking this is an incubator rather than a class
 - Inability to pivot

Class 4: Product-Mission Fit, Dual Use

- Team member too busy for Beneficiary Discovery
- Wants to “build the product” not MVPs
- Denial. Bad things happen (potential beneficiary falls through, co-founder quits, beneficiaries aren’t buying, etc.)
 - Don’t spin it to yourself, or your co-founders or investors
 - And definitely don’t spin it to your teaching team

Teaching Objectives:

- *Reinforce the concept of tiered Beneficiaries*
- *Confirm they know how to validate Product / Sponsor Fit*
- *Confirm they understand the advantages of pursuing Dual-Use opportunities*
- *Understand where and under what conditions it is necessary to Pivot*
- *Explain the concept of Mission Achievement in the context of mission driven organizations such as the DoD/IC.*
- *Explain the differences between assessing and measuring success in commercial ventures versus success in the DoD/IC*
- *Explain why Beneficiaries can have unique Mission Achievement criteria and why they may not be aligned and - in some cases- can even be opposed.*
- *Emphasize the importance of developing metrics and measures that can be used to assess progress towards Mission Achievement*

Key Concepts

Students should leave Week 4 with an understanding of:

1. Pivot
2. Product / Sponsor Fit
3. Dual Use
4. Mission Achievement
5. Beneficiary Creep

Why?

- Most teams will not find Product-Mission fit in the first 3 weeks. This week is designed to give teams another week to spend time understanding how they should best solve their sponsor’s problem. By now more than half the teams are considering *pivoting*.
- The DOD/IC is embracing the idea that *dual-use products* - commercially available products that can be bought for military uses offers faster acquisition and deployment. For a company the military offers a first beneficiary.
- *Beneficiary Creep* occurs when a team adds so many *beneficiaries* until that they are trying to satisfy an impossibly broad array of interests – and solve too many pains and gains. Teams often experience this in the first few weeks of the class. It will be much easier for teams to apply this course correction earlier versus later in the course. n
 - Because it increases the overall scope of their project, Beneficiary Creep can also

Class 4: Product-Mission Fit, Dual Use

introduce extra saboteurs. The more Beneficiaries' problems teams solve, the more likely they are to threaten other stakeholders' programs and equities.

How? Have the teams start by presenting

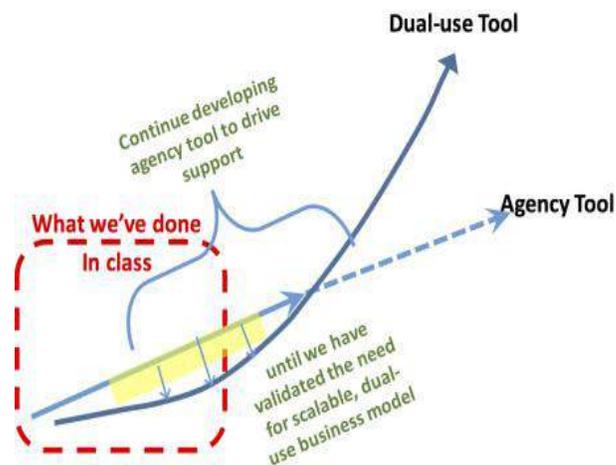
- | | |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slide 1: Title Slide | <ul style="list-style-type: none">• Updated |
| Slide 2 & 3: Cust Discovery | <ul style="list-style-type: none">• Discovery Updated, Slide 3 new photos |
| Slide 4: Mission Model Canvas | <ul style="list-style-type: none">• Updated changes shown in red• Multi-sided markets shown in different colors |
| Slide 5: Beneficiaries | <ul style="list-style-type: none">• Capture your weekly beneficiary discovery experience in a chart• Have they changed over time? |
| Slide 6: Value Prop Canvas | <ul style="list-style-type: none">• Updated to show your proposed value prop/product/service that addresses the beneficiaries |
| Slide 7: Diagram Product-Mission work flow | <ul style="list-style-type: none">• Show your expanded understanding of how the pieces fit together |
| Slide 8: MVP | <ul style="list-style-type: none">• Show us your MVP of the week |
| Slide 8: Experiments for | <ul style="list-style-type: none">• What hypotheses, experiments and MVPs will you test next week |

- By this class session some teams have had of key parts of the Mission Model Canvas invalidated. If that happens, teams should be prepared to pivot.
- Teams have to decide on who's the #1 beneficiary while keeping other beneficiaries in mind who can help them get the produce deployed.
- Teams need to identify a *target beneficiary* whose needs they want to serve. They should then separate the remaining beneficiaries into Up/Down Stream and tangential beneficiaries. These potential beneficiaries represent possible market opportunities, but their tangential nature makes their inclusion imprudent at this stage in a startup's life. Teams should know they exist, but stay focused on their mission
 - Up/Down Stream beneficiaries are not the direct users, but derive benefits and utility from the product's use by the target beneficiary.
 - Tangential Beneficiaries are those who have related problems or needs that are unconnected to the *Target Beneficiary*.
 - Target Beneficiaries are the most important beneficiaries who you want to help.
 - Tangential Beneficiaries are beneficiaries who have similar problems and could benefit from your product, but are not your target beneficiaries.
- “Validate the Problem”: Ensure students develop their understanding of the problem.
 - Teams must validate both their understanding of the problem and their designated *Target Beneficiaries* with their Government Sponsors. (via interviews)
 - Teams must validate their understanding of the problem with their *Target Beneficiaries*.
- “Validate the Product”: Teams need to validate their products (solution) using MVPs.

Class 4: Product-Mission Fit, Dual Use

They know they're right when their beneficiaries are so excited they take the MVP from them.

- Explain an instance of good Product-Mission Fit with an example so students know what they should be striving for.
- In order to build a profitable company teams are encouraged to identify commercial customers in addition to a DoD/IC customers. This is a *Dual Use* application.
 - Sponsors may actually prefer acquiring a *dual use* product. Make sure the teams ask!
- An advantage of Dual-use for the government is that it distributes risk. In non-Dual Use, the Government assumes all the entire R&D burden and along with it all of the risk of failure. However, dual-use distributes burden and risk among commercial investors not just the Federal.
- The downside is that VC's rightly so, view the DOD as a distraction to scaling a profitable company.
- Explain the path to dual use commercialization of problem solutions using Dual-Use Trajectory Diagram to illustrate the long-term utility of dual-use.



Big Ideas to point out as you critique this class session

- What would it take to make this a commercial product?
- Who's your primary beneficiary?
- Who do you think is going to matter to get this deployed?
- Who do think has the money?
- Who's the saboteur?

Common Errors

- A team that seems lost and still unsure how to validate Product-Mission Fit
- Teams still sounding like they're pitching products
- Not asking beneficiaries if they prefer to buy a Dual-use product
- Confusing dual-use with selling to multiple government agencies (ie: selling the same product to the DHS and DOD):
- Not validating the timeline when validating Product / Sponsor Fit
- Having too many Target Beneficiaries. Teams who fail to prune their Beneficiaries wind up in "Beneficiary Creep". This can hamstring students in the coming weeks and should be addressed and corrected. It increases student's workload and chances of saboteurs. This happens regularly within the DOD while drafting formal requirements and is called "Requirement Creep."

Class 4: Product-Mission Fit, Dual Use

Advanced Lecture: Mission Achievement



Mission Achievement
H4D Advanced Lecture 4

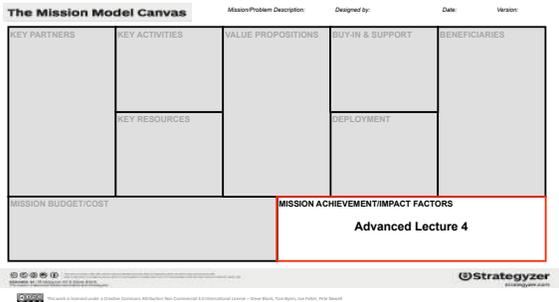
In the commercial world, success for startups and established companies alike can generally be measured by revenue and profit. Mission driven organizations like those in the DoD/IC, however, require a different measure.

There is no revenue to measure for mission driven organizations in the DoD and IC.

Instead, our outcome of interest- our dependent variable that all our activities and inputs are intended to impact – is best defined as **“Mission Achievement”**

None of these are measured in dollars and cents. Keep in mind, there is only mission achievement if it delivers value to the end beneficiary.

Aggregate must benefit greater good – not everyone e.g. saboteurs



Key Points in Advanced Lecture 4

In these mission driven organizations, the outcome of interest - the dependent variable that all activities and inputs are intended to impact – is best defined as **“Mission Achievement”**- and it cannot be measured in dollars and cents. Replacing “Revenue Streams” used in the Business Model Canvas with “Mission Achievement” in the “Mission

Model Canvas” is the key adaptation needed to address the types of national security problems we focus on in the course.

Class 4: Product-Mission Fit, Dual Use



Counterinsurgency is an example where achieving one mission can detract and even undermine the success of accomplishing another.

MRAP in Southern Afghanistan

What is mission achievement at tactical level? Reducing casualties experienced while on patrol? By this metric this solution achieves the mission. But...Angered locals and increased mortar and rocket attacks. If mission achievement is to build trust and rapport with the population and gain support in defeating the Taliban- MRAP's fail at this.

Measures of performance are not always Measures of effectiveness

Emphasize that it is important to appreciate "Mission Achievement" can be defined very differently across beneficiaries. Your solution may address the pains and gains of one set of beneficiaries and help to achieve a mission but this same solution may do nothing– or even undermine- the mission success of another.

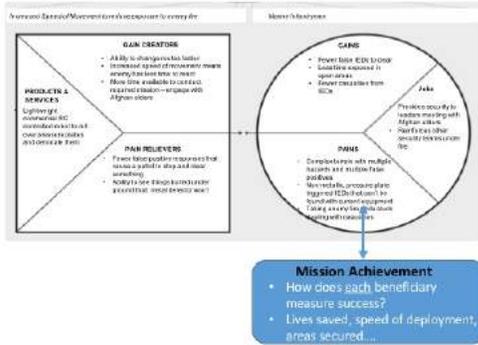


Here is another MVP based on receiving some "customer feedback" in the form of rockets and mortars.

Mission Achievement defined in operational terms may require interaction with population to gain support needed to make it harder for insurgents to emplace IED's in the first place. In Afghanistan, units that "got out of the MRAP" and interacted with customers (local population) were able to better understand their pains and gains and the gesture of assuming risk to do this alone often helped build rapport and increase information flows

But...assume greater risk. This unit experienced a lethal IED attack on a vehicle similar to this. 2 Special Forces soldiers were killed. They would have survived the blast had they been traveling in an MRAP

Class 4: Product-Mission Fit, Dual Use



So it is important for students to understand how each beneficiary measures mission achievement/success but also to appreciate that ultimately *-overall* Mission Achievement is aggregated and is the value created for the sum of all of the beneficiaries.

Mission Achievement: The value you are creating for the sum of all of the beneficiaries i.e. the greater good.

- Mission achievement may be viewed and/or measured differently for each beneficiary
- Ultimately, must deliver value to the sum of all beneficiaries
- Can be challenging to measure

It's important to distinguish between the value for individual beneficiaries (on the Value Proposition Canvas) and overall *Mission Achievement*

Know what mission you are helping your sponsor accomplish. Just as you may help your sponsor better understand the problem you may also help them better understand the mission and how to measure progress towards

achieving it.

For example, *Mission Achievement* could be measured in a variety of ways:

- the number of soldiers saved from roadside bombs,
- the number of cyberattacks prevented,
- the increased target surveillance of sensor fusion, etc.

None of these are measured in dollars and cents. Keep in mind, there is only mission achievement if it delivers value to the end beneficiary.

Aggregate must benefit greater good – not everyone e.g. saboteurs

Readings for next week: Mission Achievement

TBD

Team Presentation for Class 5: Mission Achievement

Slide 1: Title/Intro Slide

- Continue to update the interview counts and your problem description.

Slide 2: Beneficiary Discovery

- What hypotheses did you test and how?
- What were the results of that experiment and what do you plan to do with it?

Class 4: Product-Mission Fit, Dual Use

Slide 3: Mission Model Canvas

- Color code and associate Value Propositions with Beneficiaries
- Note that Beneficiaries are *not entire organizations*.

Slide 4 to n (n being the number of Beneficiaries): Value Propositions for each Beneficiary

- What pain points does your solution solve?
- What gains does your solution add for this beneficiary?
- What is your proposed product/service that addresses all of this?
- Updated Beneficiary Archetype/Persona for each beneficiary

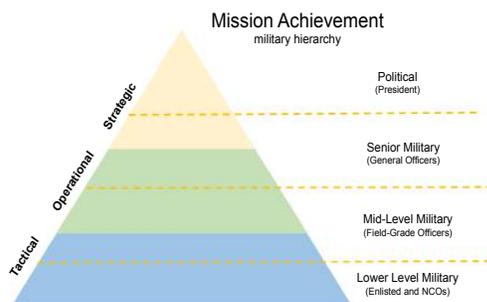
Slide 5: MVP (+ Experiments conducted)

Slide 6-n: Mission Achievement

In your final slide next week restate Mission Achievement from the MMC and describe how you will measure it e.g. metrics or other outcomes.

Break out beneficiaries that have different definitions and/or metrics of Mission Achievement and list them.

If these differences are determined by rank or hierarchy in the organization, present them in a “Tiered Mission Achievement Pyramid”



Encourage students to keep that in the military, Mission achievement is often tiered. They need to be cognizant of someone’s rank and position in the organization when interpreting their responses to questions on how they measure success. Students must also ensure they address mission achievement for multiple levels of the organization. You will need Buy-in up and down the hierarchy to rapidly deploy a solution. In

hierarchical military organizations mission achievement may be defined differently across different rank levels or by different levels of focus—e.g. tactical, operational, and strategic. In these cases encourage students to adapt a “Tiered Mission Achievement” template available to their problem.

ARCYBER – Mission Achievement

ARCYBER/COCOMS

Big General (decision maker)	☐ Quickly understand key thematic points of adversary’s use of social media put out by intelligence briefs.
MAJLTCOOL (operational planner)	☐ Determine what types of themes are rising in popularity and better identify type of response (e.g. intrusion, denial, direct reply).
Analysts/Operators (actionable insights)	☐ New adversary IO movements can be understood and tracked with less direct cooperation of cultural/language experts.

Big Picture Success Analogy:

“Most COCOMs and IO shops spend their whole day looking for a **needle in a haystack**: a user, a post, an IP address. For **narrative-level awareness**, we need a strategy that helps us divide the haystack into a bunch of **smaller haystacks** that don’t all look like **same damn pile of hay**.”

Class 5: Mission Achievement

Class 5: Mission Achievement

Week	Team Presentation	Lecture	Topic
Week 4	Product-Mission Fit & Dual Use	Lecture 4	Mission Achievement
Week 5	Mission Achievement	Lecture 5	Buy-in & Support
Week 6	Buy-in & Support	Lecture 6	Deployment

Class Introduction

Pivots A pivot is defined as a substantive change in one or more components of the [mission model canvas](#) (any of the 9 boxes). A pivot occurs after learning that your hypotheses about a specific part of the canvas are wrong. Often it's a change in who's the beneficiary / stakeholder / customer. Or it may be a change in the value proposition you're delivering to those beneficiaries or it can be a substantive change in *any* of the 9 boxes of the canvas.

The two most important parts of a [mission model canvas](#) are the beneficiaries and the value proposition. The combination of these two is called "product/market fit." If you're not getting beneficiaries grabbing your value proposition out of your hands, you don't have product/market fit.

While this sounds simple, as the teams are discovering this week, you don't get a memo that says your hypotheses are wrong. At first you just get ambiguous data. You think hmm, perhaps I just need to talk to more people or the "right" people or just tweak the feature set. After a while you begin to realize your assumptions are incorrect, (or in this class, it's even possible that the sponsor's assumptions were incorrect.) It feels depressing and confusing. Finally, it dawns on you that it's time to consider a pivot. A pivot is the lean methodology's way to *fire the plan without firing people*. Pivots are what allows startups to be agile, and to move with speed and urgency.

In an actual startup, trying to complete the rest of the mission model canvas if you don't have product/market fit is just going through the motions. Yet for the purpose of the class (versus an incubator) we do just that – we keep marching the teams through [each canvas component](#) because we want to teach them about all nine parts of the canvas. This creates cognitive dissonance for the teams – on purpose. Even though they are focused on learning about the next part of the canvas, every team continues to tenaciously search for that fit. (If we would insist they do it, it would feel like extra assigned work. When they do it on their own, it's because it's an obsession to solve the problem.)

This week we are seeing the typical class distribution. Several teams are in the despair, depressed and confused stage, a few are coming to the realization that it's time to pivot, and others think they have product/market fit. It's all part of the class. They and you will be surprised where the teams end up by the end of the class.

Mission Achievement In a company you know you've been successful when you generate revenue and profit. But in the military success has different metrics. This week the teams'

Class 5: Mission Achievement

assignment was to understand what Mission Achievement and/or Mission Success looked like for each of their sponsor organizations and each of the beneficiaries inside that organization.

Teams should be showing some real progress by Lecture 5: they should now have covered the right side of the canvas with Mission Achievement, and should have a basic handle on their key metrics of success.

- Go around the classroom and ask a random team member from each team to succinctly state what Mission Achievement is for their sponsor organization and how it can best be measured. Try to move fast knowing that the response many would prefer to use is “its complicated” e.g. in cases where there are stark differences across beneficiaries.
- Highlight an example from a team’s Customer Discovery interviews that provides evidence of the disparities in how Mission Achievement can be articulated across beneficiaries.
- Ask for volunteers to provide examples from their team’s beneficiary discovery efforts of where there beneficiaries had different concepts or understanding of Mission Achievement, why they were different and how this impacts the teams plans to develop a solution. For each volunteer ask the team what they intend to do to accommodate these disparities.

Teaching Objectives:

- *Reinforce* the concept of Mission Achievement in the context of mission driven organizations such as the DoD/IC.
- *Remind teams* the differences between assessing and measuring success in commercial ventures versus success in the DoD/IC
- *Explain* why Beneficiaries can have unique Mission Achievement criteria and why they may not be aligned and - in some cases- can even be opposed.
- *Emphasize* the importance of developing metrics and measures that can be used to assess progress towards Mission Achievement
- *Explain* Buy-in and “Get, Keep, Grow” concept and graphic
- *Explain* Support comes after “Get” and is a part of “keep”
- *Explain* Supporters versus Advocates
- *Explain* Standards and Field Support

Class 5: Mission Achievement

Key Concepts

Students should leave Week 5 with an understanding of:

- Mission Achievement
- Success in the DoD/IC
- Revenue in Dual-Use cases
- Metrics for success
- “Tiered“ Mission Achievement

Why?

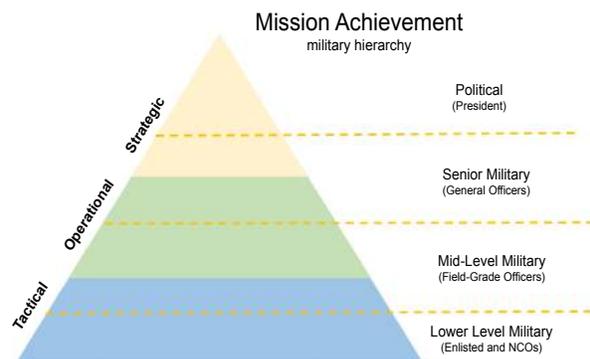
- Replacing revenue streams with mission achievement is one of the core modifications made to the Business Model Canvas to create the Mission Model Canvas. This adaptation makes it possible to adopt Lean methods to address problems faced by mission driven – versus revenue and profit driven organizations.
- Mission Achievement might be defined differently for every Beneficiary. Appreciating that organizations are not monolithic in how Mission Achievement is defined and measured is a key insight for students and will inform how they develop their solution and measure success.
- Understanding Mission Achievement and how it is measured across multiple beneficiaries, is a critical prerequisite for students to develop a viable and targeted strategy to gain buy-in and support which is the topic of next week's lesson.

How? Have the teams start by presenting

- Slide 1: Title/Intro Slide** • Updated
- Slide 2 Customer Discovery** • Discovery Updated
- Slide 3: Mission Model Canvas** • Updated **changes shown in red**
- Slide 4 Value Propositions for each beneficiary** • Capture your weekly beneficiary discovery experience in a chart
- Slide 5: Value Prop Canvas** • Updated to show your proposed value prop/product/service that addresses the beneficiaries
- Slide 7: MVP** • Show us your MVP of the week
• What hypothesis is it testing?
- Slide 8: Mission Achievement** • Break out beneficiaries that have different definitions and/or metrics of Mission Achievement and list them.

- Remind students that in the military, Mission achievement is often tiered
- They need to be cognizant of someone’s rank and position in the organization when interpreting their responses to questions on how

Hacking for Defense™ (H4D):
Educators Guide



Class 5: Mission Achievement

they measure success.

- Students must also ensure they address mission achievement for multiple levels of the organization. You will need Buy-in up and down the hierarchy to rapidly deploy a solution.
- In hierarchical military organizations mission achievement may be defined differently across different rank levels or by different levels of focus- e.g. tactical, operational, and strategic.
- In these cases encourage students to adapt a “Tiered Mission Achievement” template available to their problem.

Big Ideas to point out as you critique this class session

- Understanding how to measure mission achievement/success for each beneficiary is the difference between a demo and a deployed solution.
- Mission Achievement is very different in the commercial context versus within the DoD/IC. Commercial success is typically measured by revenue, whereas the DoD/IC uses impact and other non-monetary criteria.
- Teams pursuing dual use solutions will find that their Commercial and DoD/IC Mission Achievements can be very different plan for both simultaneously.
- Saboteurs can exist everywhere, to include a team’s Sponsor Organization. Anticipate them by looking for Beneficiaries that have very different assessments of Mission Achievement.
- Using a team’s Beneficiaries, help the students understand that Mission Achievement is tiered and therefore is dependent on the beneficiary or stakeholder’s position in the organization.

Common Errors in Week 5

- Not using color coding to match Beneficiaries to their Mission Achievement.
- Vague or High-level Mission Achievement for each Beneficiary
- Only Specifying one Mission Achievement instead of separate ones for each Beneficiary
- Vague or non-existent metrics for measuring success of Mission Achievement

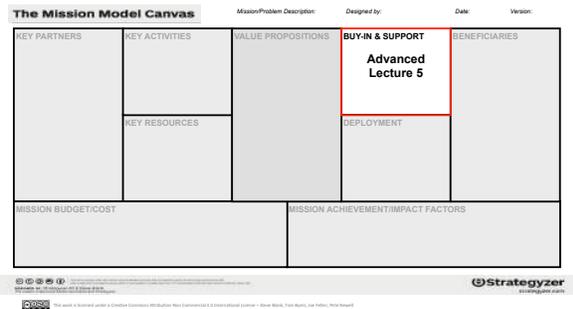
Advance Lecture: Buy-in & Support



Buy-in and Support
H4D Advanced Lecture 5

Through finding Product-Mission Fit you’ve discovered the ecosystem surrounding your problem is a crowded place full of actors with competing demands. You now need separate the beneficiaries from supporters, advocates and the saboteurs that might be lurking in plain sight in order build a tribe to help you help your beneficiary achieve their mission.

Class 5: Mission Achievement



Key Points in Advanced Lecture 5

Advocates and supports are people you need to help you get your solution deployed. Saboteurs are people who goal in life is to insure you aren't successful, either intentionally or because they are not incented to do otherwise. You need a plan to convert people to be supporters and more importantly advocates of your solutions pathway.

Supporters vs Advocates

- Supporters: Will lend you a hand. These are the people who would "Like" something on Fb or LinkedIn
- Advocates: Will give a speech on your behalf. These are the people who would make a comment and "Share" something that you posted on fb or LinkedIn



- Separating supporters from advocates is so simple its hard
- Supporters will help you when asked and will avoid letting you be surprised by bad news.
- Advocates will go to bat for you and tell your story in their own words

Saboteurs

- Saboteur = People or organizations threatened by your new product/service/program
- Every new Value Proposition has a (or multiple) saboteur(s)
 - Because your value prop:
 - ↳ Takes away authority
 - ↳ Takes away headcount
 - ↳ Takes away budget (or contract)
 - ↳ Changes reporting
 - ↳ Obsoletes existing product or workflow

If you don't know who the saboteurs are you are dead
If you can't isolate, neutralize or turn the saboteurs your solution may never deploy

- Saboteurs are people or organizations threatened by your new product / program
- Every new Value Proposition has a (or multiple) saboteur(s) Because your value prop: Takes away authority; Takes away headcount; Takes away budget (or contract); obsoletes existing product or workflow.

Field Support/Standards

- Every new Value Proposition has to be supported
 - Typically by an existing organization
 - They hate change, surprise and incompatible products
 - Do not surprise them
 - How is your value prop going to be supported when it is deployed
- You need to understand what the existng standards are
 - If you are non-standard make a compelling case why
 - Do not invent to architectures, API's, etc. if existing is good enough

the energy exerted to do it. You have to articulate how your solution is way more valuable

- The complexity of a battlefield is always going to be a saboteur
- Adding more to the camel's back without removing something is easily attacked.
- Going thought the effort to remove something and add something of similar value isn't a very good value proposition for

Class 5: Mission Achievement

- Trying to cause a complete change of an architecture in order to delivery your solution is a bad idea unless the architecture is the problem you are supposed to fix.

How can I get someone to articulate my value proposition using their words?

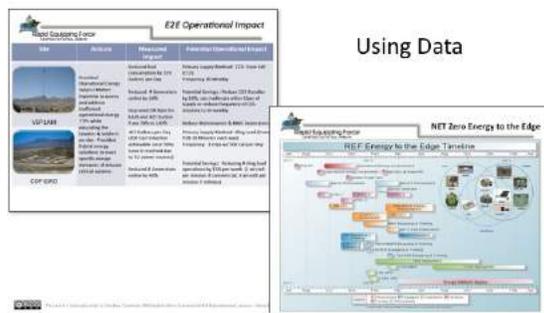
Anecdotes, Artifacts and the Art of Story-Telling

Gaining advocates by helping them help you. Give them clear, concise descriptions of what you are trying to accomplish. Make the package easy for them to deliver on your behalf in their own words

Using Emotion



Use simple pictures that elicit emotional response. This graphic shows an effort intended to get beneficiary feedback that supported our efforts to create small outposts that were completely self-sustaining.



Using Data

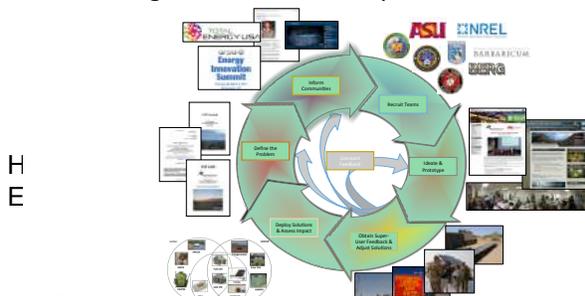
Back your pictures up with data to convert the emotional response into a supportable activity. This also the first step in fending off saboteurs who will question the impact, variability, safety, legality (insert 50 other descriptors here) of your solution.

The chart at upper left reflects the OPERATIONAL IMPACT of our effort to theater commanders

The chart at the bottom right shows how we were integrating our deployment plan to reduce to increase its viability.

Both charts were intended to arm our advocates with enough info to deflect saboteurs they ran across.

Combing both to tell a a Story



HE

Class 5: Mission Achievement

Here is an example of a single slide that provides enough prompts to tell the entire story of our effort.

Use your story to help find more advocates and to arm them with a story to tell for you

Readings for next week: Buy-in & Support

(Customer Relationships)

Read SOM (Startup Owner's Manual):

- pp. 126-143: Customer Relationships Hypothesis
- pp. 296-303: Get/Keep/Grow

Team Presentation for Class 6: Buy-in & Support

Slide 1: Title/Intro Slide

- Continue to update the interview counts and your problem description.

Slide 2: Weekly Beneficiary Discovery Summary

- What hypotheses did you test and how?
- What were the results of that experiment and what do you plan to do with it?

Slide 3: MMC

- Update MMC: Focus on Deployment and Buy-In, but continue to refine Beneficiaries, Value Proposition

Slide 4: Value Propositions for each Beneficiary

- Continue to refine your Value Proposition and Beneficiary Archetype / Persona for each beneficiary

Slide 5: MVP

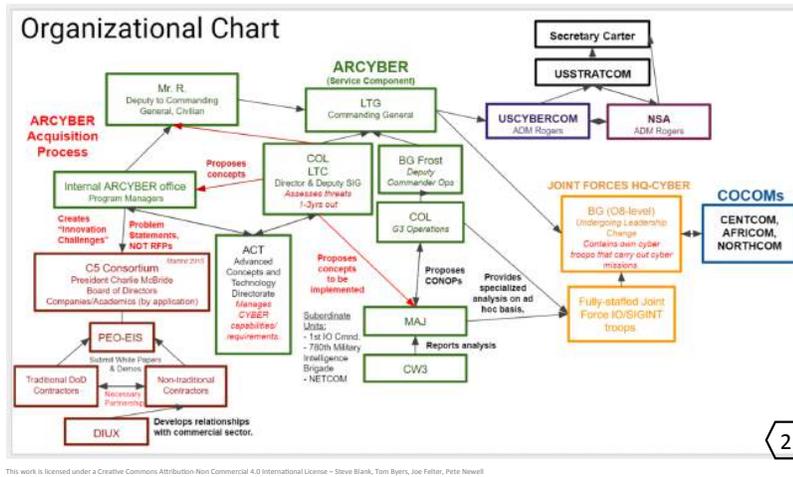
- MVP is a tool to test your hypotheses about your MMC; it is not necessarily your product

Slide 6: Organizational Chart/Influence Chart

- Create an organizational chart of your sponsor, and detail all the relationships and connections that exist that could impact your success.
 - Who reports to who?
 - How is information passed along?
 - Who are the gate-keepers?

Class 5: Mission Achievement

- Who writes requirements?
- Who authorizes funding / moves money?
- Who's buy-in / support is critical?
- Who are the saboteurs?



Slide 7: Buy-in / Support story for your product (include how to gain buy-in from specific gatekeepers in a narrative format)

- Explain who is needed to win over and how you are going to go about it.

Slide 8: Get-Keep-Grow Diagram

- Create a Get-Keep-Grow diagram for your solution.



Class 6: Buy-in and Support

Class 6: Buy--in & Support

Week	Team Presentation	Lecture	Topic
Week 5	Mission Achievement	Lecture 5	Buy-in & Support
Week 6	Buy-in & Support	Lecture 6	Deployment
Week 7	Deployment	Lecture 7	Activities, Resources, & Key Partners

Class Introduction

- This week as the teams talked to more beneficiaries to see how they can get buy-in, some are beginning to realize how many layers of the organization they'll need to get a product or service in the hands of the people who need it. This week they're going to find out even more as they get the advanced lecture on deployment.
- Check-in with them briefly and ask, "what was your biggest surprise in finding out who needed to buy-in to make this happen?"
- At this point in the class a few teams are feeling like they're on a roller coaster and may be in the trough of despair. Encourage them, let them know they're going to come out Ok



Teaching Objectives

- Reinforce Buy-in and "Get, Keep, Grow" concept and graphic
- Reinforce Support comes after "Get" and is a part of "keep"
- Review Supporters versus Advocates
- Review Standards and Field Support
- Introduce students to the different paths that solutions are deployed within the DoD
- Introduce and familiarize students with key deployment related concepts including Acquisition Cycles; Technology Readiness Level (TRL); Bracket Cost
- Prepare students to draw Deployment Flow diagrams.
- Emphasize to students that Deployment is more than financing. Its scope includes Explain how products get Deployed in the DOD/IC

Class 6: Buy--in & Support

- *Describe* purchasing authority
- *Introduce* Acquisition Cycles
- *Discuss* color of money

Key Concepts:

Students should leave Week 6 with an understanding of:

- Dual-Use
- Buy-In/Support
- Supporters vs advocates
- Deployment timeline
- Technology Readiness Level
- Purchasing authority
- Color of Money
- OTA

Why?

- Many students believe once you found someone enthusiastic about the product it's going to get adopted and deployed. The reality that in the DOD there a lots of competing interests and they all have different motivations
- Last week the students learned about getting buy-in from the ecosystem surrounding their sponsors problem - a crowded place full of actors with competing demands.
- Students started to separate out the beneficiaries from supporters, advocates and the saboteurs. They started drawing organizational diagrams and influence maps. This week we'll see how well they understood it.
- This week you're going to teach them how to take all that information and figure out how to get their solution deployed – out to where people need and can use their product.
- This requires them to understand acquisitions process, deployment methods, color of money and influence

Class 6: Buy--in & Support

How? Have the teams start by presenting

- | | |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slide 1: Title Slide | <ul style="list-style-type: none">• Updated |
| Slide 2 & 3: Beneficiary Discovery | <ul style="list-style-type: none">• Discovery Updated, Slide 3 new photos |
| Slide 4: Mission Model Canvas | <ul style="list-style-type: none">• Updated changes shown in red• Multi-sided markets shown in different colors |
| Slide 5: Beneficiaries | <ul style="list-style-type: none">• Focus on Deployment and Buy-In• Capture your weekly beneficiary discovery experience in a chart |
| Slide 6: Value Prop Canvas for each beneficiary | <ul style="list-style-type: none">• Updated to show your proposed value prop/product/service that addresses the beneficiaries |
| Slide 7: Diagram
Organizational Chart/Influence Chart | <ul style="list-style-type: none">• Create an organizational chart of your sponsor, and detail all the relationships and connections that exist that could impact your success.<ul style="list-style-type: none">○ Who reports to who?○ How is information passed along?• Who are the gate-keepers |
| Slide 8: Buy-in / Support story for your product | <ul style="list-style-type: none">• how to gain buy-in from specific gatekeepers• Explain who is needed to win over and how you are going to go about it. |
| Slide 9: Get-Keep-Grow Diagram | <ul style="list-style-type: none">• Create a Get-Keep-Grow diagram for your solution |
| Slide 10: MVP | <ul style="list-style-type: none">• Show us your MVP of the week |
| Slide 11: Experiments for next week | <ul style="list-style-type: none">• What hypotheses, experiments and MVPs will you test |
-
- Have the teams talked to all the people they would need to get buy-in for deployment?
 - Can they succinctly tell you who the advocates and supporters are? Do they know the difference?
 - Do they know who the saboteurs are?
 - Have they articulated a story – that contains both emotion and data?
 - Can they draw a get/keep/grow diagram?
 - What are the standard they need to support? In the field? Legal? Policy?

Class 6: Buy--in & Support

Big Ideas to point out as you critique this class session

- Once you find Product-Mission fit the goal is figure out what it takes to get the product deployed. Who did they need to get? First? Second? Third?
- In intelligence agencies policies and legal can kill a project, check with those organizations first
- For some agencies being non-standard (hardware, software api) may allow you to be more innovative, but can kill you in deploying at scale. Understand the risks and know who needs to ok/and advocate for you

Common Errors in Week 6

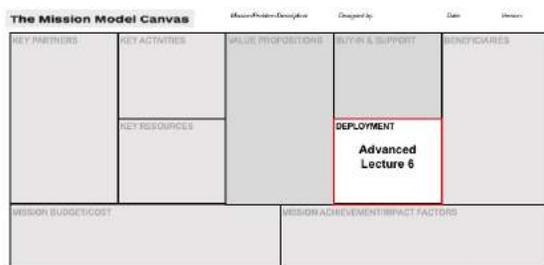
- Not getting past their original sponsor and not knowing who you need buy-in from
- Not knowing the saboteurs
- Not knowing the current standards they need to support or work around
- Not knowing how the product will be supported

Advanced Lecture: Deployment



Deployment
H4D Advanced Lecture 6

There is hard, then there is hard like trying to figure out how solutions actually get deployed.



was too hard or was fragile

Key Points in Advanced Lecture 6

- This lesson will by no means make you an expert in finance, contracting or procurement, however it will leave you with a good set of questions you can use to start your research
- Sometimes right solution doesn't get to a beneficiary because the deployment pathway

Understanding your Sponsors Buying Habits

- Culture of acquisitions: Do they buy big or do they buy rapid?
- Technical Maturity: What is the bottom floor that they focus on?
- Program stage of sponsor: Is the problem connected to an existing program or is this something new?
- Cost: What are the cost limits they have imposed?

- As you begin your deployment fact finding with your sponsor these are some of

Class 6: Buy--in & Support

the key things you should understand about their background

- Understanding them should enable you to ask better more informed questions and should shape your expectations

DoD/IC Business Operations

- Each organization has a different mission which influence acquisition culture
 - Do they buy for big requirements or to fill capability gaps?
 - How do they treat acquisition authorities – strictly or will they take risk?
 - Do they have access to contracts with scope for your solution
 - Will they send \$ to contracts in other agencies?

Culture is important! Even though acquisition authorities exist to demo concepts, does not mean a program manager or contracting officer will or can use them.

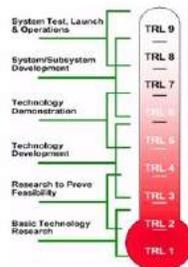
accomplish it in a timely manner. One of the biggest hurdles faced by program managers in the government is actually spending their money on what they want. Others have difficulty because they don't understand their own system well enough

- Asking an organization to perform an unnatural act with money or a contract creates a fragile deployment path. Its possible but be prepared for it to fail.

- This may prove to be a series of difficult conversations within your sponsors organization as they people you need to talk to don't readily discuss contract and funding with people outside the organization, get your sponsor to help you.
 - Just because an organization has the funding to spend and the desire for your type of tech, doesn't mean they can actually

Technical Maturity

- DoD "Technical Readiness Level" determines the type of funding and deployability
- Understand what level your solution is today and where it will need to be a different stages during your deployment plan
- Know how much \$ do you need to develop your solution to the next Technical Readiness Level



- Terminology and verbiage matters: know if your solution is in the research phase, is ready for development or for demonstration. Make sure your definition is the same as the definition of your sponsor
 - Know how much \$ it will take to get you from one level to the next

Purchasing Authority Thresholds



Understand the type of funding and projects your organization tends to fund!

- Sometimes a 70% solution in a year is better than a 90% solution in 5 years.

- You should consider these thresholds as bumpers to enable you to match the scope of where your potential solution is today vs what type of funding and contracts might be required to get it to the next level and deploy it. It is possible to exceed these thresholds by the more you exceed them the harder it is to get \$ and contracts that will support your effort

Class 6: Buy--in & Support

Key Activities

Ask your sponsors how their organizations handle these activities i.e. in-house or separate orgs, average time,

- Contract action - Request for Information / Request for Proposal
- Demonstrations – do they run their own, if so how frequently?
- Testing – how much is required in order to deploy
- Evaluate – who will do the evaluation of the solution and where
- Integration – if the solution has to be integrated with something else who will the integrator be?

- Ask how your sponsor how they actually get deployment work done
- If you can't draw a workflow diagram from what you learn from them, you don't know enough (and neither do they).

Readings for next week

- Article describing SOCOM partnering with industry. <http://www.specops-dhp.com/interesting-post/building-partnerships-for-efficiency/>

Team Presentation for Class 7: Deployment

- Talk to 10-15 Beneficiaries

Slide 1: Title/Intro Slide

- Continue to update the interview counts and your problem description.

Slide 2: Beneficiary Discovery

- Capture your weekly beneficiary discovery experience in a chart

Slide 3: Beneficiary Discovery Pictures

Slide 4: Mission Model Canvas

- Color code and associate Value Propositions with Beneficiaries
- Note that Beneficiaries are *not entire organizations*.

Slide 5: Revised Value Proposition Canvas

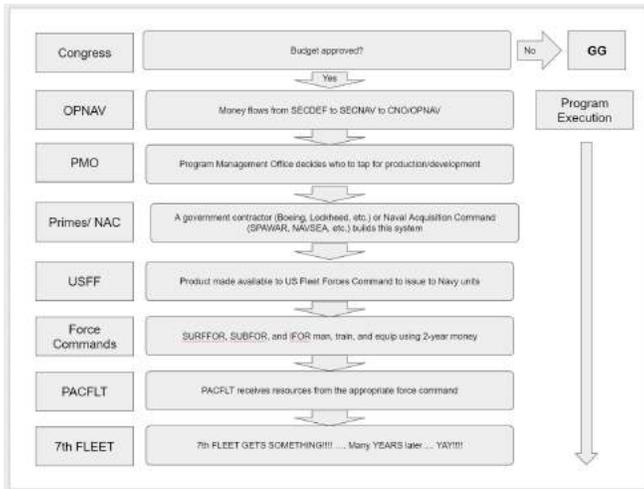
Slide 6 MVP

- Tell us what hypothesis the MVP is testing, what data you expected and what you

Slide 7: Sponsor Procurement Process

Class 6: Buy--in & Support

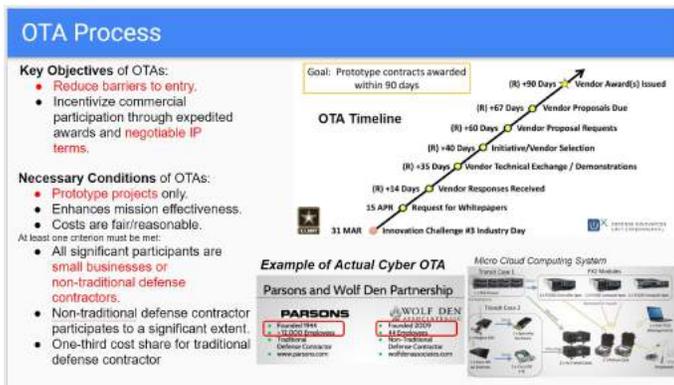
Here is a great example of perfect solution deployed way too late



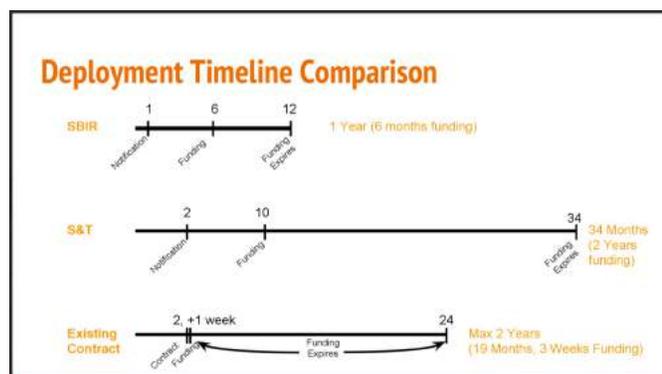
- This represents a top down deployment.
- Notice it says the sponsor will receive something many YEARS later.
- The sponsor provided this as an example of a route they had identified, but would not pursue

Slide 8: Potential Deployment Strategies

- There are multiple variations of funding, contracting and deployment timelines
- Use something to compare the pros and cons of each one and take into consideration the timelines and funding modes of these different methods of deployment



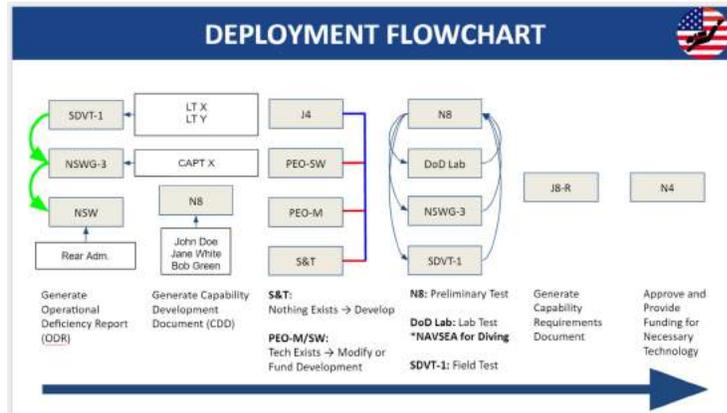
- Detail the most likely method or pathway to deployment that your team has identified.
- Identify the constraints and conditions of using that deployment method.



Class 6: Buy--in & Support

Slide 9: Deployment Diagram

- If your sponsor does have a method to propose deployment of a solution, work with them to lay out the specific activities that need to be completed to rapidly deploy.
- In addition to necessary activities in this process identify the people who will be involved (organizations don't do things, the people inside them do)



Class 7: Deployment

Class 7: Deployment

Week	Team Presentation	Lecture	Topic
Week 6	Buy-in & Support	Lecture 6	Deployment
Week 7	Deployment	Lecture 7	Activities, Resources, & Partners
Week 8	Activities, Resources & Partners	Lecture 8	Mission/Budget Cost

Class Introduction

Open class with a discussion of “So you have this great solution to your sponsor’s problem that will add real value to beneficiaries and help them achieve their important mission...now what? All of your efforts are for naught if you can’t make a play to deploy the solution to the end users that need it. “

Remind them that the assignment for next week will be the standard presentation as well as a draft of their final Lessons Learned Presentations – but no discovery.

Teaching Objectives:

- *Ensure the students are familiar* with deployment concepts including Acquisition Cycles; Color of Money, Technology Readiness Level (TRL); Bracket Cost and that they can draw Deployment Flow diagrams.
- *Introduce* Activities, Resources, and Key Partners
- *Explain* risks, benefits, and difficulties of Partnerships.
- *Explain* differences between Government Partnerships, Dual-Use Partnerships, and traditional Corporate Partnerships.
- *Explain* unique benefits that Government and Dual-Use Partnerships provide.
- *Ensure Students are able to* complete Gantt Charts, Activity Maps, and Key Partner Canvas

Key Concepts

Students should leave Week 7 with an understanding of:

- Deployment Flow Diagram
- Acquisition Cycle
- Technology Readiness Level
- Bracket Cost
- Color of Money
- Activities, Resources, and Key Partners
- Technology Readiness Level
- Dual-Use Partnership

Class 7: Deployment

Why?

- The DOD has plenty of demos. You don't want to be another one of those.
- The “buck stops here” for a proposed solution if students are unable to deploy it to the end users and stakeholders that need it.
- Students may have Buy-in/Support must become familiar with the constraints and opportunities of the DoD and government deployment processes to get down the road to mission achievement.
- Students need to understand the concept of Technology Readiness Level and appreciate what the DoD specifies for solutions that are going to be deployed.

How? Have the teams start by presenting

- | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Slide 1: Title Slide | <ul style="list-style-type: none">• Updated |
| Slide 2: Beneficiary Discovery | <ul style="list-style-type: none">• Discovery Updated, Slide 3 new photos |
| Slide 3: Mission Model Canvas | <ul style="list-style-type: none">• Updated changes shown in red• Multi-sided markets shown in different colors |
| Slide 4: Value Prop Canvas | <ul style="list-style-type: none">• Updated to show your proposed value prop/product/service that addresses the beneficiaries |
| Slide 5: MVP and Experiments | <ul style="list-style-type: none">• Show us what you have shown the Beneficiaries.• What experiments are you conducting? |
| Slide 6: Sponsor Procurement Process | <ul style="list-style-type: none">• Explain to us how the sponsoring organization typically procures new equipment. |
| Slide 7: Deployment Strategies | <ul style="list-style-type: none">• Identify multiple Deployment strategies and explain the pros and cons. |
| Slide 8: Deployment Diagram | <ul style="list-style-type: none">• Graphically explain how you will deploy your solution.• Show various deployment methods |

Big Ideas to point out as you critique this class session

The timing of the fiscal year and the color of money impact both limitations as well as opportunities for deploying proposed solutions. The DoD and other government agency officials are often scrambling in August and September to spend their remaining budgets before the fiscal year ends on Sep 30th. Savvy students who know their Beneficiaries can leverage this to their advantage.

Deployment is more than financing, although the two are often inextricably linked in the DoD. Deployment encompasses both how proposed solutions to problems get through the acquisitions process and sell to the Government as well as how they will get their product into the hands of the users.

Class 7: Deployment

The deployment timeline should match the timeline for Beneficiaries that was used to validate Product / Sponsor Fit. Deployment options that take too long are invalid and should not be pursued.

Just a Note About Team Dynamics By this time in the class the benefit of having a team of mixed business and technical resources becomes apparent. Teams that are just all technologists quickly grasp product/market fit (the right side of the canvas) but often have a hard time understanding the left side of the canvas (activities, resources, partners and costs.) When the technologists work together with business focused students as a team, the learning is impressive.

However, the downside is that one of failure modes of teams (and startups) is a team that doesn't jell. One of the symptoms is technologists going heads-down building product and features without customer input while they defer all of the left-side of the canvas to the business team. Or conversely business team members draw timelines and costs without a deep understanding of the technology hurdles.

Almost every class has a team or two that goes through team conflict – different working styles, different time commitments, pivots taking them to places where they're no longer interested, etc. Given that 1/4 of startups meltdown over team dynamics before funding, seeing this happen to teams in the class isn't a surprise. We treat team dynamics as a normal part of learning in the class. (Team members get to grade each other on their contributions as part of their final grade.)

Common Errors in Week 7

- High Level deployment strategy (for example: we will buy the parts of the beacon, build the beacon, and send it to the 7th Fleet).
- Deployment strategy is only valid for one Beneficiary (ie: Color of money legally bars other Beneficiaries from using the product).
- Primarily interviewing *users* instead of *buyers*.
- Key players are revealed by the Deployment Diagram who are not listed under "Buy-in."
- Failing to draw Deployment Diagram, or diagram is unclear.
- Failing to present (or consider) Deployment timeline
- Deployment timeline incompatible with timeline validated in Product / Sponsor Fit
- Only investigating the acquisitions side of Deployment

Advanced Lecture Part 1: Activities, Resources & Partners

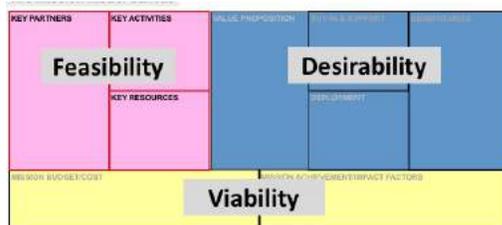


Activities, Resources, and Partners
H4D Advance Lecture

Activities are the expertise and resources that the company needs to deliver the value proposition. They might be hardware development, software expertise, manufacturing, launching rockets, funding, etc. *Resources* are the internal company-

Class 7: Deployment

owned activities. Examples are a company-owned manufacturing facility, big data or machine learning engineers, DOD proposal writers, venture capital, etc. *Partners* are the *external* resources (third parties) necessary to execute the Activities. i.e. outsourced manufacturing, system integrators, etc. other companies, that will provide those activities



This is a reminder from lesson 1 of how the parts of the canvas fit together

The right side of the canvas makes sure you are doing the right thing

The left-side of the canvas makes the right-side possible. It's the "back-stage" activities.

The bottom makes the top achievable and that's how problems get solved....

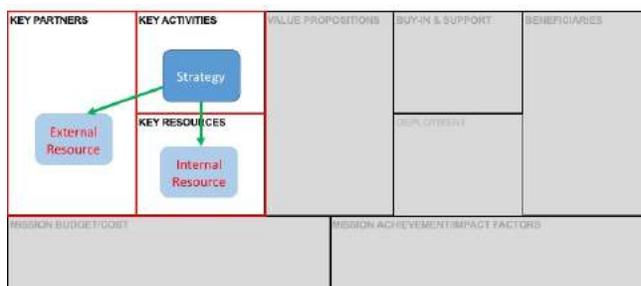
Activities, Resources and Partners

- What are the most important things (**activities**) you must do to make this Mission Model Canvas work?
- What are the types of **resources** and what specific needs does your team have in relation to those?
- What **partners** will you need now to fill the gaps in your resources? What stake do they have in helping you?
 - Financial: What options do you have? What future funding are you going to need? How does that tie into DoD/IC procurement? Remember RDT&E dollars will only get you so far. Answering these questions often drives you to find partners.
 - Human: Learning new skills requires a teacher; Honing your individual skills requires a coach; Evolving over your individual career requires a mentor; Advisors help grow your effort
 - IP: Do you have it or does somebody else?
 - IT: Authorities to operate your software on a network, hardware system or during specific events
 - Testing: By who, to what level and when/where under what circumstances

Key Points in advanced Lecture 7

- What are the most important Resources you need? Financing, Physical infrastructure, IP, Human capital?

- Physical: Where will you get your supplies? How capital intensive are your goods? Satellites (expensive) vs Software (cheaper)

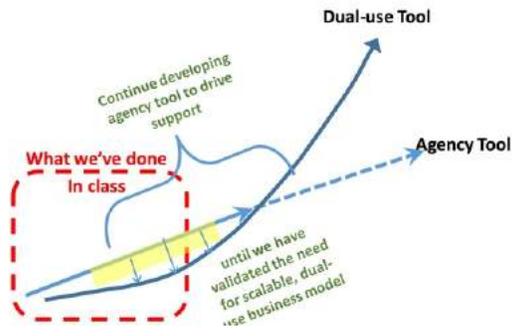


- By listing the KEY activities you have to perform you are beginning to lay out the strategy by which you will actually get your solution deployed. These key activities will all require resources to accomplish.

- KEY resources are those resources you require from within your organization to complete your KEY activities.

Class 7: Deployment

- KEY partners are those people externally to your organization who have resources you will require in order to get your solution deployed. You may early in the discovery process actually identify and treat Key partners as beneficiaries or advocates/supporters. Its ok to do so, eventually you will figure out which is which.



- One of the key activities you may discover is that you will need to build a new product or form a new business in order to complete the mission. At this point you will have to consider building a Business Model Canvas in parallel with your Mission Model Canvas

- The key words here are IN PARALLEL. Your focus in creating the Business Model Canvas is to validate the need for a dual use tool

or product. While doing so do not stop your MMC work as it is what will drive continued support for the tool or product within your sponsors organization.

Resources

Budget

- Often a zero sum game
- Dual use development offers relief

Headcount

- Often a zero sum game

Time

- Not your best friend – the slower you move the more opportunity there is for your resources to go someplace else

have? What future funding are you going to need? How does that tie into DoD/IC procurement? Remember RDT&E dollars will only get you so far. Answering these questions often drives you to find partners.

- Human: Learning new skills requires a teacher; Honing your individual skills requires a coach; Evolving over your individual career requires a mentor; Advisors help grow your effort
- IP: Do you have it or does somebody else?
- IT: Authorities to operate your software on a network, hardware system or during specific events
- Testing: By who, to what level and when/where under what circumstances

- What are the most important Resources you need? Financing, Physical infrastructure, IP, Human capital?

- Physical: Where will you get your supplies? How capital intensive are your goods? Satellites (expensive) vs Software (cheaper)

- Financial: What options do you

Partners

Friend or Foe?

- External contractor
 - Are they winning new business or losing existing?
- DOD
 - New requirements for overworked DOD element?
 - Legal, Policy, Security
 - Don't be surprised at the last minute by their requirements
- Commercial
 - Opposing goals detrimental to mission accomplishment

- It's always better to co-opt required partners rather than try and force them to help you

- Be ready to recruit. What Value Proposition are you meeting for your partner,

v6.3

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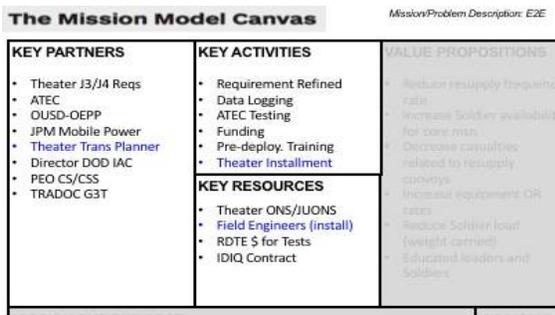
Class 7: Deployment

- especially if they have no stake in the problem or solution
- Recognize that what you are asking for may create another burden someplace else – are you ready to compromise?



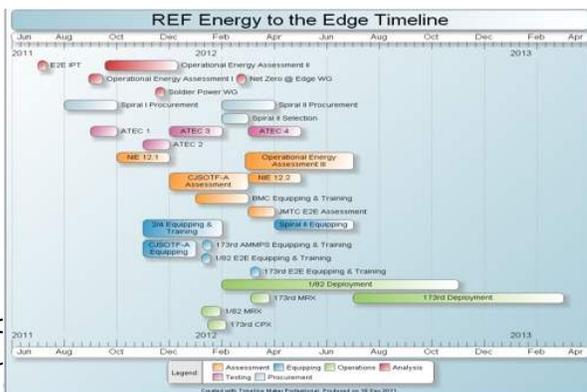
For background: In Afghanistan the “drawdown” often meant that that small units of 10-15 members used to move into village to help the tribal elders stabilize the area. On the cart you see the power and water requirements needed to sustain that small element on a daily basis. If the small element was accepted by the elders and showed promise of success commanders would reinforce that success by sending more

assets, which always meant more people, to help spread the stabilizing influence. These small increase in size lead to massive increase in supply requirements that often could only be met by airdropping supplies to the base which is horribly inefficient. The goal of the Net Zero project was to reduce these supply requirements to the lowest theoretical limit.



Here is the MMC for the NetZero Energy to the Edge (E2E) project.

- In blue is highlighted the key activity of theater installment of the equipment
 - Under key resources highlighted in blue are the engineers (human capital) we required to do the installation. These engineers were already deployed as part of our assessment team and as such were an INTERNAL resource
- Highlighted in blue under Key Partners is the Theater Transportation planner. This person was overworked, under-resourced and absolutely critical to us in getting the right pieces of equipment delivered on time in the right order. Because we were asking him to perform more work than he already couldn't handle we brought in our own planners to help him temporarily with his workload. Not only did they take care of our work, but they also helped him clear his backlog.
 - By understanding his unmet needs and helping him meet them we were able to get our key activity completed. Co-opt and compromise your way to success when you can.



This rudimentary GANTT chart represents “a way” to plot key activities and resources required over time. This is what an MVP deployment strategy looks like.

Class 7: Deployment

Readings for next week: Activities, Resources & Partners

- Online Lesson 8: *Activities and Resources* (Before Lesson Key Partners)
- Online Lesson 7: Key Partners
- Read SOM pp. 169-175: Key Resources (Note for MVP 1.3: May want to use this instead of video 8)
- Read SOM pp. 176-177: Partners
- Review Key Partner Canvas to better understand who your key partners are and how you both benefit of the relationship:

Team Presentation for Class 8: Activities, Resources & Partners

Slide 1: Title/Intro Slide

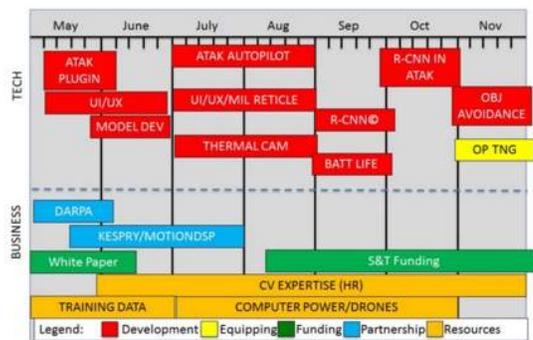
Slide 2: Beneficiary Discovery in a chart

Slide 3: Mission Model Canvas

Slide 4: MVP

Slide 5: What are your Critical Activities

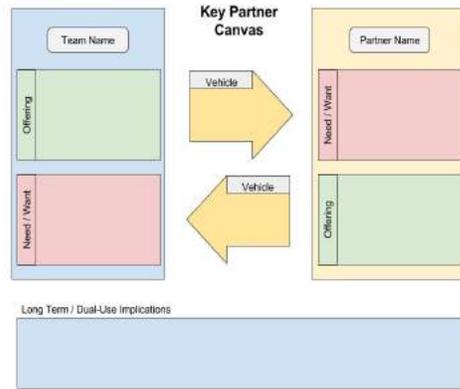
Activities



- What are the activities you need to perform to complete your team's value proposition? (e.g. manufacturing, launching rockets, getting funding)
- Who will you partner with and what resources do they provide?
- What is the timeline of those activities?

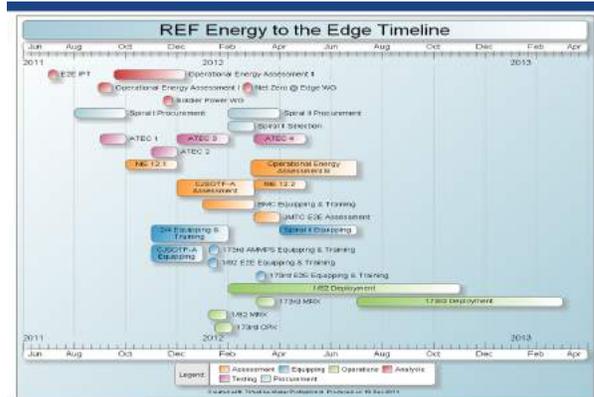
Class 7: Deployment

Slide 6: Key Partners needed to achieve mission success

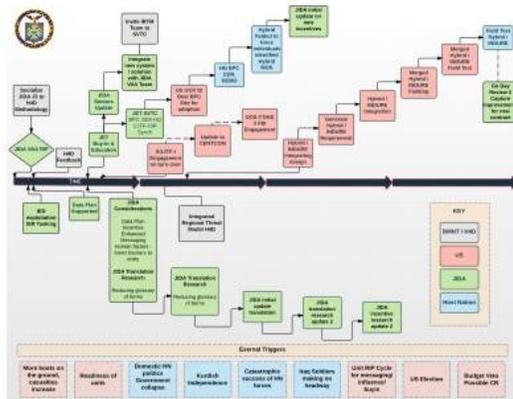


Class 7: Deployment

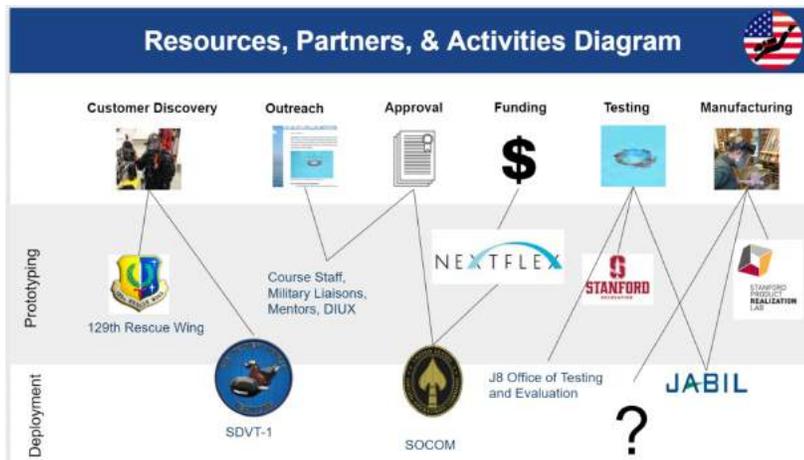
Slide 7: What are the critical Resources you'll need? Gantt Chart



Time, Activities and Partners Arrayed as a Strategy



- Are they resources you already have? Do you need to acquire or partner with others to get them? How much will they cost?
- What human resources will you need? What equipment resources will you need? What financial resources will you need to acquire all these resources?



Class 8: Activities, Resources, & Key partners

Class 8: Activities, Resources, & Key partners

Week	Team Presentation	Lecture	Topic
Week 7	Deployment	Lecture 7	Activities, Resources, & Key Partners
Week 8	Activities, Resources & Partners	Lecture 8	Mission/Budget Cost Reflections
Week 9	Mission/Budget Cost	<i>Workshop 3</i>	Reflections

Class Introduction

- For the first time teams are now presenting the feasibility of actual building and delivering the solution they've spec'd
- Understanding the left-side of the [mission model canvas](#) (*activities, resources, partners, and costs*) forces all teams to ask, "Are we building a product for a DOD/IC customer only or do we have a "dual-use" product that could be sold commercially and get funded by venture capital?"
- By now Teams will want to slow down or stop calling beneficiaries. Don't let them slow down the pace of discovery and customer calls

Teaching Objectives:

- *Ensure the students are familiar* with Activities, Resources, and Key Partners concepts and understood the risks, benefits, and difficulties of Partnerships.
- *Ensure they understand* Government and Dual-Use Partnerships.
- *Ensure Students understand* Gantt Charts, Activity Maps, and Key Partner Canvas
- *Introduce* Operating Plans
- *Introduce* Burn Rate
- *Explain* Costs in DoD/IC Terms
- *Explain* the differences between Traditional Commercial Operating Plans, Commercial Startup Operating Plans, and Operating Plans for Startups selling to the DoD/IC

Class 8: Activities, Resources, & Key partners

Key Concepts

Students should leave Week 8 with an understanding of:

- Activities
- Resources
- Partners
- Gantt Chart
- Activity Map
- Key Partner Canvas
- Dual-use Partners
- Costs
- Operating Plan
- Burn Rate
- Costed Bill of Materials
- Opportunity Cost

Why?

- Activities, resources and partners are the things the key things you need to do to make the rest of the business model (value prop, deployment, mission achievement) work.
- "How these activities get accomplished" are a function of resources and if necessary partnerships.
- Comment on other egregious parts of the canvas as necessary

How? Have the teams start by presenting

- Slide 1: Title Slide**
 - Updated
- Slide 2: Beneficiary Discovery**
 - Discovery Updated, Slide 3 new photos
- Slide 3: Mission Model Canvas**
 - Updated **changes shown in red**
 - Multi-sided markets shown in different colors
- Slide 4: MVP and Experiments**
 - Show us what you have shown the Beneficiaries.
 - What experiments are you conducting?
- Slide 5: Critical Activities**
 - What activities do you need to perform?
 - What is the timeline on those activities?
- Slide 6: Key Partners Needed**
 - What Partners will you need to achieve mission success?
- Slide 7: What are the critical Resources you'll need**
 - Gantt Chart
 - Are they resources you already have? Do you need to acquire or partner with others to get them? How much will they cost?
 - What human resources will you need? What equipment resources will you need? What financial resources will you need to acquire all these resources

Class 8: Activities, Resources, & Key partners

Big ideas to point out as you critique this class session

Activities

- What are the types of Activities you will perform? Manufacturing? Supply chain? Problem solving? This really gets to the root of what kind of company the team thinks they will be.

Resources

- Highlight the five categories of resources: Physical, Financial, Human, Government, and Intellectual capital. Ensure students understand that resources are more than just financial capital. Continue to emphasize the potential advantages that government funding can provide e.g. non-dilutive capital.
- The effect of people upon the culture of the startup. Students should be able to enumerate the ways in which a startup's intellectual property can be protected.
- Intellectual property protection is a resource. The assumptive path (patents) may not be the right one to choose at this stage.

Partners

- Large or well-established business rarely have incentives to help startups. Startups tend to be limited to transactional "coin-operated" partnerships.
- What are the Risks associated with having a partner and how to manage them.
- Offer suggestions on how a startup selects a partner.
 - What alignment does this partner have with your customers?
 - What need do you solve for this partner and how important is it to the partner?
 - What economic benefit does this partner provide your business? What economic benefit does your business provide this partner?
 - How many partners are there like this?
- The differences between strategic alliances, competition, joint ventures, buyers, suppliers, and licensees.
- While partners are critical for large companies (most companies do not do everything by themselves), strategic alliances and joint ventures are not needed to serve Earlyvangelists. They are needed for mainstream customers.
 - For startups, partners can monopolize your time.
 - Partners must have aligned goals and customers.
- Some partnership examples:
 - Partnership disasters: Boeing 787.
 - Strategic alliances: Starbucks partners with Pepsi, creates Frappuccino. Starbucks partners with Dryer's to create and market a line of Starbucks Ice Cream flavors.
 - Joint business development: Intel partners with PC vendors.
 - Coopetition: Automotive suppliers create AIAG.
- Key suppliers: Apple builds iPhone from multiple suppliers

Common Errors in Week 8

Activities

Class 8: Activities, Resources, & Key partners

- Failing to identify many of the key Activities needed to perform in order to provide their value proposition to beneficiaries and achieve mission success.

Resources

- Uncertain or inaccurate understanding of the resources needed to achieve mission success. What resources do they need to build this business? How many people? What kind? When will they need these resources? What deployment processes do they need to **own** to be successful?

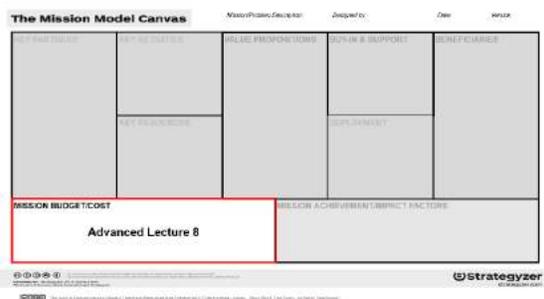
Partners

- Challenge students to explain *what benefit* the partner company is deriving from the relationship. Corporations are not altruists, and this will make them confront that fact and assess the risks of partnering.
- Not appreciating the benefit and hence incentive that a prospective “key partner” will derive from a proposed partnership.
- thinking that a startup needs all its future partners now, or even in the first year. Often not true or needed to sell to Earlyvangelists.
 - It may be that partners are important after they’ve find a repeatable and scalable business model. Or it might be that partners are important after they reach a certain size and scale. Students should think through why and when they need them.
 - Differentiate partners needed for “optics” for financing or customers feeling comfortable, versus those really needed to scale the business.



Mission Budget and Dual-Use
H4D Advanced Lecture 8

Advanced Lecture Part 1: Mission/Budget Cost



Key points in Advanced Lecture 8

- In this last lesson on the Mission Model Canvas we’ll talk about building the mission budget that will allow you to deploy a solution that meets your beneficiaries mission achievement factors

Class 8: Activities, Resources, & Key partners

Know how much of what kind of money you need in order to deploy your solution to effectively accomplish mission achievement as described by your beneficiaries

Readings for part 1 next week: Mission/Budget Cost

- (Metrics That Matter) Read Startup Owner's Manual
 - 438-446 Metrics That Matter
 - 528 Validate Financial Model
- pp. 267-269: Can We Make Money;
- Review Mark Leslie slides: <http://www.slideshare.net/markleslie01/0110-business-model02>

Team Presentation for Part 1 of Class 9: Mission/Budget Cost

requirement for next week is to:

Slide 1: Title/Intro Slide

- Continue to update the interview counts and your problem description.

Slide 2: Beneficiary Discovery in a chart

- What hypotheses did you test and how?
- What were the results of that experiment and what do you plan to do with it?

Slide 3: Mission Model Canvas

- Focus on Mission Budget/Costs, but continue to refine other parts
- Color code all your changes

Slide 4: Value Proposition Canvas for each Beneficiary

- Continue to refine your Value Prop and Customer Archetype / Persona for each beneficiary

Slide 5: MVP (+ Experiments conducted)

Slide 6: Diagram of Cost Flows (e.g. BOM)

- Create a diagram of your cost flows.

Class 8: Activities, Resources, & Key partners

Readings for part 2 of next week: Reflections

Watch the Owlet video. A great example of how to organize a final Lessons Learned Presentation.

<https://vimeo.com/84423056>

See previous Hacking for Defense final presentations:

Powerpoint: <http://www.slideshare.net/sblank/tagged/stanford>

Video: <https://vimeo.com/169155566>

Advanced Lecture Part 2: Reflections

Effective communication is more than just conveying the facts. It also entails putting the facts in a context and flow that adds to their meaning and puts them in a form that brings the “listener” into the process. The analogy often used is that of a story; that good business communicators are able to combine words, images, and shared contexts (analogies) to crisply convey meaning. This is the art of the great “pitch.”

Next weeks *Reflections* session will help prepare you, not only for your team’s final presentation in this class, but with life skills that will hopefully benefit you in multiple venues, for many years. Come prepared to learn about:

Storytelling

- The World: Market/opportunity, how does it operate
- The Characters: Customers/value proposition/product-market fit, pick a few examples to illustrate
- Narrative Arc: Lessons learned how? Enthusiasm, despair, learning, then insight
- Show us: Images and demo to illustrate **learning** = wireframes and pivots to finished product)
- Editing: Does each slide advance the character and plot (learning)

Theater

- Point me at what you want me to see
- Ought to be self-explanatory
- Use analogies

Team Presentation for Part 2: Draft Lessons Learned Presentation

Put together a draft of your final Lessons Learned presentation

Each team will get to present

Class 9: Mission/Budget Costs & Reflections

Class 9: Mission/Budget Cost and Reflections

Week	Team Presentation	Lecture	Topic
Week 8	Activities, Resources & Partners	Lecture 8	Mission/Budget Cost
Week 9	1. Mission/Budget Cost 2. Reflections	<i>Workshop 3</i>	Lessons Learned Presentations
Week 10	Lessons Learned	Lessons Learned	Final Lessons Learned Presentation

Class Introduction

We use this week to do two things. First, to review Mission/Budget Cost and second, to have the students reflect on their work to date and review a draft of the Lessons Learned presentation they will be presenting next week.

Mission/Budget Cost. Due to time constraints we only have two teams present. We do the standard critique and then spend the rest of the class on reflections.

Reflections. In past versions of this class teams would call on beneficiaries until the last week of the class and then present their Lessons Learned. The good news is that their presentations were dramatically better than those given at traditional demo days – they showed us what they *learned* over 8 weeks which gave us a clear picture of the velocity and trajectory of the teams. The bad news is since their heads were down working on customer discovery until the very end, they had no time to reflect on the experience.

Teaching Objectives:

- *Ensure the students are familiar* with Operating Plans
- *Ensure the students are familiar* with Burn Rate
- *Ensure the students are familiar* with Costed Bill of Materials
- *Ensure the students are familiar* with Costs in DoD/IC Terms
- *Ensure the students are familiar* with the differences between Traditional Commercial Operating Plans, Commercial Startup Operating Plans, and Operating Plans for Startups selling to the DoD/IC
- *Explain the Format and Expectations* for final Lessons Learned presentations.

Class 9: Mission/Budget Costs & Reflections

Why?

Budget/Mission Cost

- Now that the students have learned about their Key Activities, Resources, and Partners, they need to understand how they are going to pay for all of them. This is especially relevant for the DoD as their thinking of Costs is very different than in the commercial world.
- Teams are now in a position to understand how they will set all the parts of Deployment in motion. This is detailed by the Operating Plan, which will be invaluable for students if they decide to move forward with their solution

Reflections

- We realized that we had been so focused in packing content and work into the class, we failed to give the students time to step back and think about what they learned.
- So now we use the last week of the class as a *reflection week*. Our goal—to have the students extract the *insights* and *meaning* from the work they had done in the previous seven weeks.

How? Have the teams start by presenting

- | | |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Slide 1: Title Slide | <ul style="list-style-type: none">• Updated |
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| Slide 4: Value Prop Canvas | <ul style="list-style-type: none">• Updated to show your proposed value prop/product/service that addresses the beneficiaries |
| Slide 5: MVP | |
| Slide 6: Diagram of Cost Flows | <ul style="list-style-type: none">• Create a diagram of cost flows• If you have a physical product create a BOM. |
| Slide 7: 3 Year Financial / Operations Timeline | <ul style="list-style-type: none">• Present a financial and operations Timeline for the next 3 years |
| Slide 8: (If Dual-Use) Commercial Operations Timeline | <ul style="list-style-type: none">• Map out operations timeline for commercial use |

Reflections. We asked each team to come prepared with a draft Lessons Learned presentation telling us about their journey and showing us their:

- Initial sponsor problem statement
- Quotes from beneficiaries that illustrated learnings and insights
- Pivot stories
- Screen shots of the evolution of Minimum Viable Product (MVP)
- Demo of final MVP

Class 9: Mission/Budget Costs & Reflections

We play the entire Owlet video for the class. It's great example of how to tell a story of *learning* for a final Lessons Learned Presentation.

<https://vimeo.com/84423056>

The teaching team has two or three teams presents their draft Lessons Learned presentations and dissects them slide by slide and provide feedback to the team and to the class as a whole. We discuss what general patterns and principles teams extracted from all the beneficiary interaction they've had.

In class, we then meet with the rest of the teams one-on-one and review their drafts and provide feedback to individual teams.

We use this week to help teams reflect that they accomplished more than they first realized. For the teams who found that their ideas weren't a dual-use business, we let them conclude that while it was great to celebrate the wins, they could also embrace and celebrate their failures as low cost learning.

By the time the final week of the final Lessons Learned presentations rolls around, the students were noticeably more relaxed and happier than teams in past classes. It was clear they had a solid understanding of the magnitude of their journey and the size of their accomplishments – eight teams had spoken to nearly 900 customers, built 50 minimum viable products, and tested tons of hypotheses

Key Concepts

Students should leave Week 9 with an understanding of:

- Reflection
- Costs
- Operating Plan
- Burn Rate
- Costed Bill of Materials
- Gantt Chart
- Dual-Use
- Opportunity Cost

Big Ideas to point out as you critique this class session

- Does the team have a dual-use product?
- Do they have a 3 Year Financial / Operations Timeline
- Have they taken into account the cost of producing and testing their products.
- When thinking about financial and human engineering costs, most (if not all) students will underestimate what they will actually need for their project. For instance, most engineering actually takes at least 50% longer than anticipated. Their timeline and budget should reflect a x1.5 for most engineering.
- Clearly explain why the Financial/Operations Timeline is necessary: it will allow the students to have a goal and a defined timeline in which to achieve that goal. An

Class 9: Mission/Budget Costs & Reflections

Operating plan helps the company set goals and focus on the most important aspects that will lead to success.

Common Errors in Week 9

Budget/Mission Cost

- Students may not be aware of many of the costs that will drive their finances e.g. office cost, engineering cost and time, cost of components, etc. Remind the students that even their best estimation is still an estimation and is probably inaccurate. They will almost always underestimate their costs through optimistic timelines or leaving things out.
- Students may create timelines for the most optimistic outcome. This means that the timeline will likely be underestimated and overly optimistic. Encourage them to create alternate plans and be able to adjust readily when deadlines are missed.

Reflections

- Almost all the draft presentations start out as a serial recitation of *things they did*. Some talk about the products/services they built. A few even do get around about talking about the problems they solved. But almost none start with a draft presentation showing what and how much they learned.

Team Presentation for Class 10: Lessons Learned

Slide 1

- Team name
- A few lines of what your initial idea was
- The size of the opportunity (TAM/SAM)
- Total number of interviews personally conducted (include any email interactions or survey numbers in parentheses)

Slide 2 – Team members – name, background, expertise and your role on the team. Name of mentors and their affiliation.

Slide 3 – Original Hypotheses

- The World – market/opportunity, how does it operate
- The Characters – customers/value proposition/ product-market fit, pick a few examples to illustrate
- Narrative Arc – lessons learned how? Enthusiasm, despair, learning then insight
- Quotes from customers “we loved it” or “stupid idea”
- Show us – images and demo to illustrate **learning** = diagrams, wireframes & pivots to finished product)
- Editing – does each slide advance the learning

Theater

Class 9: Mission/Budget Costs & Reflections

- Point us to what you want us to see
- Ought to be self-explanatory
- Use analogies
- Bring any “show and tell” examples

Slide 4 - Mission Model Canvas **Version 1** (use the modified Osterwalder Canvas; do not make up your own). “Here was our original idea.”

- Zoom in on the important parts of the canvas to make any key points

Slide 5 – “So here’s what we did…” (explain how you got out of the building)

- Show us your first MVP

Slide 6 – “So here’s what we found (what was reality), so then… here’s what we did”

- Zoom in on the important parts of the canvas to make any key points
- Presentation *requires* at least three Mission Model Canvas slides.
- Presentation *requires* at least three diagrams of some part of the canvas. For example:
 - Get Keep Grow Pipeline
 - Channel Diagram
 - Customer / Payer Flow
 - Activities / Resources / Partners Connections
 - Petal Diagram
 - TAM / SAM

Side n-1 – “So here’s where we ended up.” Talk about:

- What did you learn
- Show us your final MVP

Slide n

- Investment readiness slide
- Whether you think this a viable business,
- Whether you want to pursue it after the class, etc.

Class 10: Lessons Learned

Class 10: Lessons Learned: Final Lessons Learned Presentation

Week	Team Presentation	Lecture	Topic
Week 8	Activities, Resources & Partners	Lecture 8	Mission/Budget Cost
Week 9	Mission/Budget Cost	<i>Workshop 3</i>	Reflections
Week 10	Lessons Learned	Lessons Learned	Final Lessons Learned Presentation

Class Introduction

The introduction to this class is directed at the invited guests – and much less so to the students. Take this opportunity to welcome attendees and to thank key people and organizations that have made the course possible. Explain the format for the presentations and highlight what the attendees can expect to see. Generate enthusiasm for what can and should be a rewarding experience for students, teaching team and all involved in supporting the course.

Teaching Objectives

We've reinforced throughout this guide that the course is about solving problems – not about making a demo. That said, in the real world, being able to communicate your proposed solution and plans to deploy it effectively to an audience is a critical skill to develop.

While there will be no formal teaching during these lessons learned presentations – creating the environment for what may be a formative learning experience for some students is one of the main objectives of the teaching team for this event.

Why?

These presentations force the students to reflect critically on their entire experience in the course, map their discovery learning experience out and place in to context.

How? Have the teams present their final lessons learned presentation.

If possible hold the final presentations in a different venue than the classroom used in class. Invite sponsors, mentors, advisors as well as investors, technologists and others that may be interested and able to help interested student teams pursue follow on opportunities. (View the Stanford Spring 2016 video of the Lessons Learned presentation for an example of how to conduct this final session)

Class 10: Lessons Learned

Final Presentation:

Story Video: 2-minute video focused on the team's journey to solve their sponsors problem using the H4D methodology

Slide 1

- Team name
- A few lines of what your initial idea was
- The size of the opportunity (TAM/SAM)
- Total number of interviews personally conducted (include any email interactions or survey numbers in parentheses)

Slide 2 – Team members – name, background, expertise and your role on the team. Name of mentors and their affiliation.

Slide 3 – Original Hypotheses

- The World – market/opportunity, how does it operate
- The Characters – customers/value proposition/ product-market fit, pick a few examples to illustrate
- Narrative Arc – lessons learned how? Enthusiasm, despair, learning then insight
- Quotes from customers “we loved it” or “stupid idea”
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- Point us to what you want us to see
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Slide 4 - Mission Model Canvas **Version 1** (use the modified Osterwalder Canvas; do not make up your own). “Here was our original idea.”

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- Zoom in on the important parts of the canvas to make any key points
- Presentation *requires* at least three Mission Model Canvas slides.

Class 10: Lessons Learned

- Presentation *requires* at least three diagrams of some part of the canvas.

For example:

- Get Keep Grow Pipeline
- Channel Diagram
- Customer / Payer Flow
- Activities / Resources / Partners Connections
- Petal Diagram
- TAM / SAM

Side n-1 – “So here’s where we ended up.” Talk about:

- What did you learn
- Show us your final MVP

Slide n

- Investment readiness slide
- Whether you think this a viable business,
- Whether you want to pursue it after the class, etc.

Common Errors

Students think they need to tell a whitewashed success story:

- Students should strive to tell the authentic, honest story of their successes and mistakes, pitfalls, discoveries, and pivots.
- Most importantly, students should be encouraged to talk in the most specific terms possible about the customers they actually met, what they actually said, and how that changed their Business Model Canvase

Additional H4D Resources

Syllabus

H4D Syllabus Semester	https://goo.gl/9Wg9m5	2016
H4D Syllabus Quarter	https://goo.gl/RRS6b2	2016

H4D Guides

H4D Educators Guide	https://goo.gl/JywXXz	2016
H4D TA Guide	https://goo.gl/Z7aDgE	2016
H4D Mentor/Advisor Guide	https://goo.gl/m7HZNy	2016
H4D Problem Sponsor Guide	https://goo.gl/1iGjDU	2016

DOD/IC Background

DOD/IC Primer	https://goo.gl/NMCKCH	2016
DOD/IC 101 Lect. Transcript	https://goo.gl/H9XK8n	2016
DOD/IC 101 Lect. Slides	https://goo.gl/tBH5Da	2016

Lean Methodology / MMC / VPCs

MMC Packet	https://goo.gl/owTQu2	2017
VPC Packet	https://goo.gl/iCh4yu	2016
Business Model Generation	https://www.amazon.com/Business-Model-Generation-Visionaries-Challengers/dp/0470876417	2010
Value Proposition Design	https://www.amazon.com/Value-Proposition-Design-Customers-Strategyzer/dp/1118968050/	2014

Advanced Lectures

Adv. Lecture Beneficiaries	https://goo.gl/75Jqif	2016
Adv. Lecture Value Propositions	https://goo.gl/y6soZp	2016
Adv. Lecture Product-Sponsor Fit & Dual Use	https://goo.gl/mWVir2	2016
Adv. Lecture Mission Achievement	https://goo.gl/qsN9wF	2016
Adv. Lecture Buy-in & Support	https://goo.gl/kR2AX2	2016
Adv. Lecture Deployment	https://goo.gl/VyGQNY	2016
Adv. Lecture Key Activities, Resources, & Partners	https://goo.gl/Yf8iaw	2016
Adv. Lecture Costs & Operating Plan	https://goo.gl/o7Ebmh	2016

Example Student Slide Decks

Mission Model Canvas	https://goo.gl/8QcTVy	2016
Beneficiaries	https://goo.gl/dV2Pai	2016
Value Propositions	https://goo.gl/EVZQVT	2016
Product-Sponsor Fit + Dual Use	https://goo.gl/ULyU8b	2016
Mission Achievement	https://goo.gl/WG2Rzt	2016
Buy-in & Support	https://goo.gl/fvPa8g	2016
Deployment	https://goo.gl/FqXBch	2016
Key Activities, Resources, and Partners	https://goo.gl/nSokKy	2016
Costs & Operating Plan	https://goo.gl/NTjPqT	2016

Other Resources

Lessons Learned Example Student Presentation	https://www.slideshare.net/sblank/aqualink-lessons-learned-presentation-h4d-stanford-2016	2016
Lessons Learned Example Student Video	https://www.slideshare.net/sblank/aqualink-lessons-learned-video-h4d-stanford-2016	2016
Steve Blank Blog	https://steveblank.com/category/hacking-for-defense/	2016
Steve Blank Kickoff Blog	https://steveblank.com/2016/01/26/hacking-for-defense-stanford/	2016
Dual-Use Diagram	https://goo.gl/Gsy3dZ	2016
Tiered Mission Achievement	https://goo.gl/maiGj2	2016
Key Partner Canvas	https://goo.gl/4ENQG3	2016
Prototyping Support	https://goo.gl/x276L8	2016