



DHS Research Funding Opportunities and Transition Pathways Webinar

August 13, 2020

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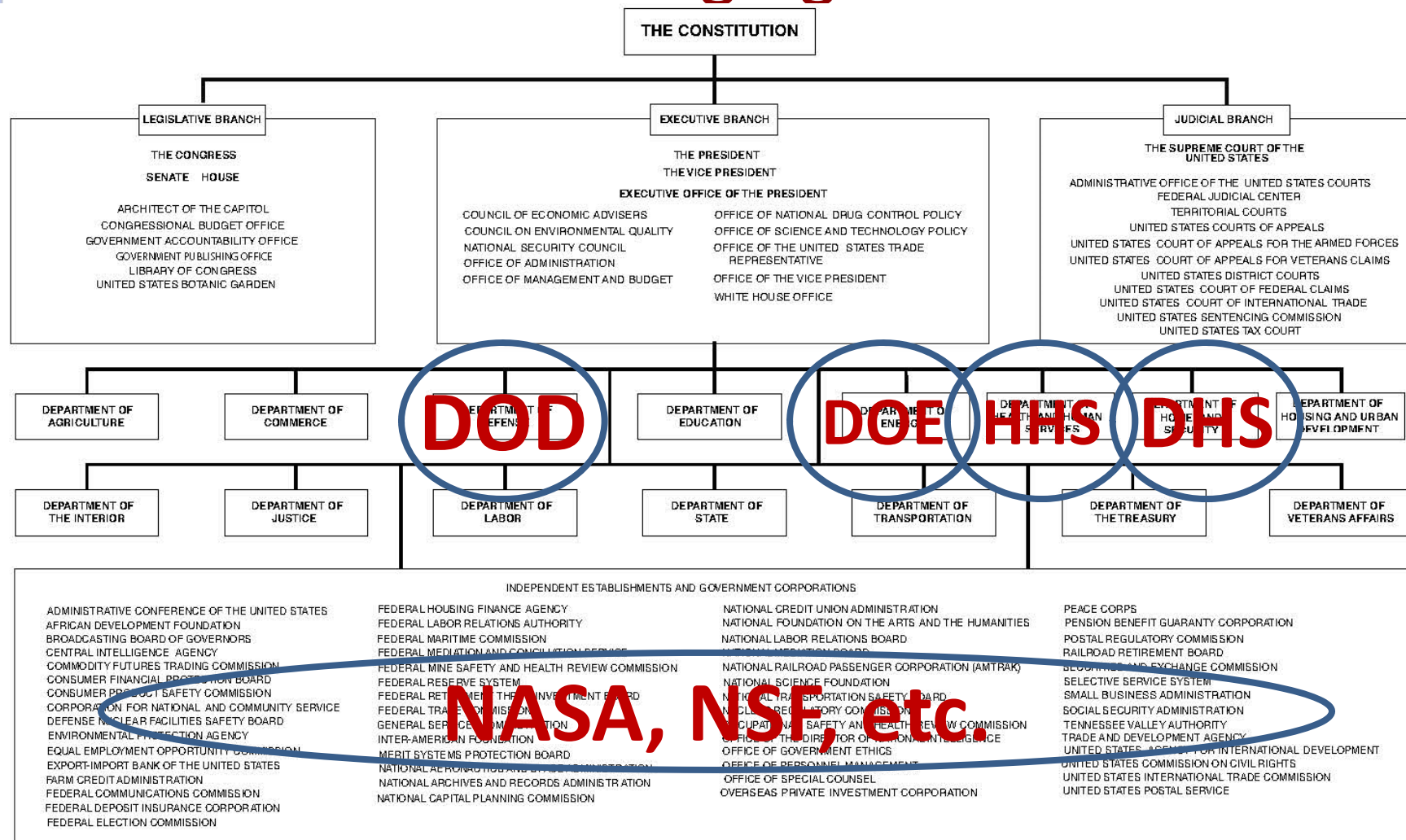
**Associate Director for Transition and Commercialization
Center for Risk and Economic Analysis of Terrorism Events
(CREATE)**



DHS Research Funding Opportunities and Transition Pathways Webinar

- The DHS Research Agenda
 - Why DHS
 - \$'s funded, success stories of R&D solutions
- DHS – Components - S&T – OUP, COEs
 - Application Domains
 - \$s from each
- DHS Solicitations
 - Specific Opportunities
 - Pathways for submitting proposals
- The Research Results to Transition Pathway
 - Transition How-To, CREATE Faulty Research Examples
 - CREATE Faculty Research and non-CREATE examples of proposals and transitions
- Ideas for Collaboration with CREATE-affiliated faculty

US Government Organizational Chart: Selected R&D Funding Agencies



US Government R&D Funding

Table 1. Federal Research and Development Funding by Agency, FY2018-FY2020

(budget authority, dollar amounts in millions)

Department/Agency	FY2018 Actual	FY2019 Enacted	FY2020 Request	Change, FY2018- FY2020		Change, FY2019- FY2020	
				Dollar	Percent, Total	Dollar	Percent, Total
Department of Defense	\$52,386	\$55,832	\$59,463	\$7,077	13.5%	\$3,631	6.5%
Dept. of Health and Human Services	36,942	38,647	33,693	-3,249	-8.8%	-4,954	-12.8%
Department of Energy	17,482	17,793	14,718	-2,764	-15.8%	-3,075	-17.3%
NASA	11,755	n/a	11,280	-475	-4.0%	n/a	n/a
National Science Foundation	6,327	n/a	5,760	-567	-9.0%	n/a	n/a
Department of Agriculture	2,618	n/a	2,464	-154	-5.9%	n/a	n/a
Department of Commerce	2,029	n/a	1,694	-335	-16.5%	n/a	n/a
Department of Veterans Affairs	1,286	1,342	1,325	39	3.0%	17	-1.3%
Department of Transportation	1,043	n/a	1,076	33	3.2%	n/a	n/a
Department of the Interior	883	n/a	733	-152	-17.0%	n/a	n/a
Department of Homeland Security	725	n/a	507	-218	-30.1%	n/a	n/a
Environmental Protection Agency	192	n/a	205	207	12.1%	n/a	n/a
Smithsonian Institution	357	n/a	315	-42	-11.8%	n/a	n/a
Department of Education	257	258	224	-33	-12.8%	34	13.2%
Other	1,181	n/a	540	-641	-54.3%	n/a	n/a
Total	135,765	n/a	134,097	-1,668	-1.2%	n/a	n/a

Source: CRS analysis of data from EOP, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2020, Research and Development*, March 18, 2019, p. 269, https://www.whitehouse.gov/wp-content/uploads/2019/03/ap_21_research-fy2020.pdf. The "FY2019" column includes enacted funding levels for only those



So Why DHS?

- CREATE – First [DHS Center of Excellence](#), currently Emeritus designation
- Excellent reputation of faculty at S&T
- Solid performance in delivering quality, useful products (TTKPs – technologies, tools and knowledge products/refereed publications)
- CREATE's Basic Ordering Agreement is in place for expedited negotiation of SOWs and budgets in response to TORs, rapid funding



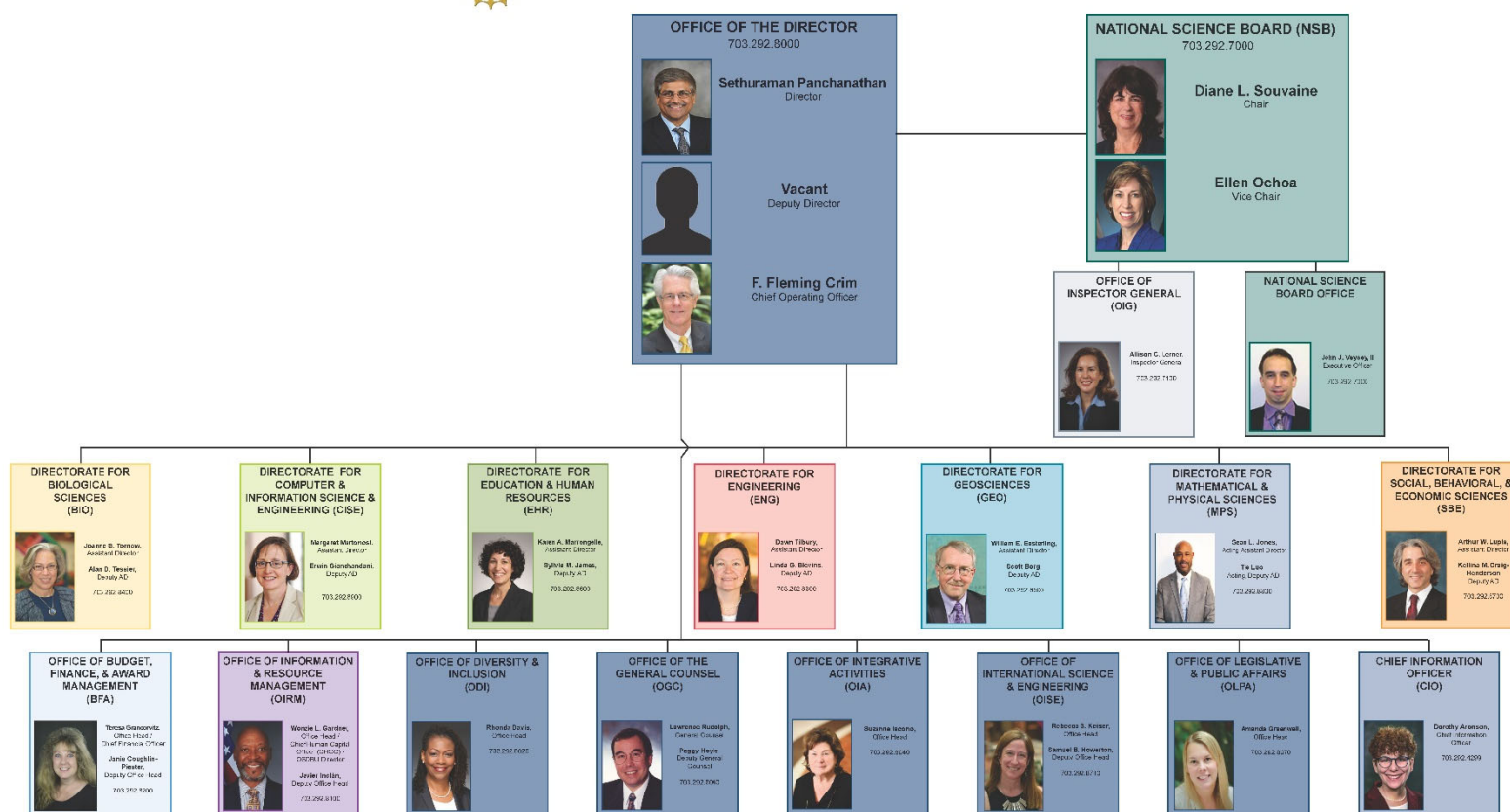
Overview of Funding from DHS

- Science and Technology (S&T) Directorate responsible for coordinating all DHS R&D - > ~\$1B per year
 - Seven components have R&D budget authority
 - S&T obligated nearly 80% of R&D funds
- R&D needs in four homeland security mission areas
 - Disaster Resilience
 - Critical Incidents
 - Border Security
 - Cybersecurity
- R&D conducted by combination of industrial companies and universities

NSF Organizational Chart



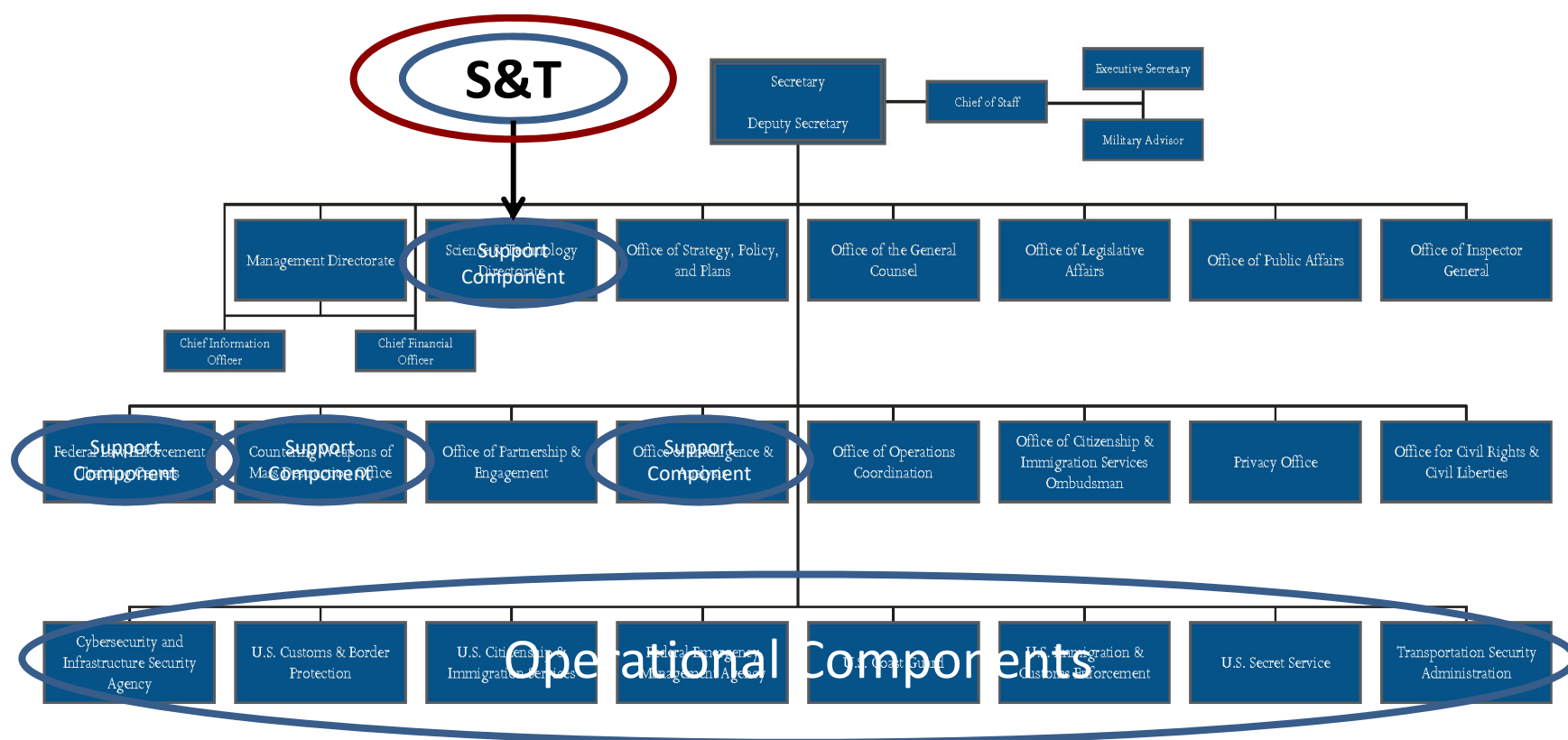
NATIONAL SCIENCE FOUNDATION



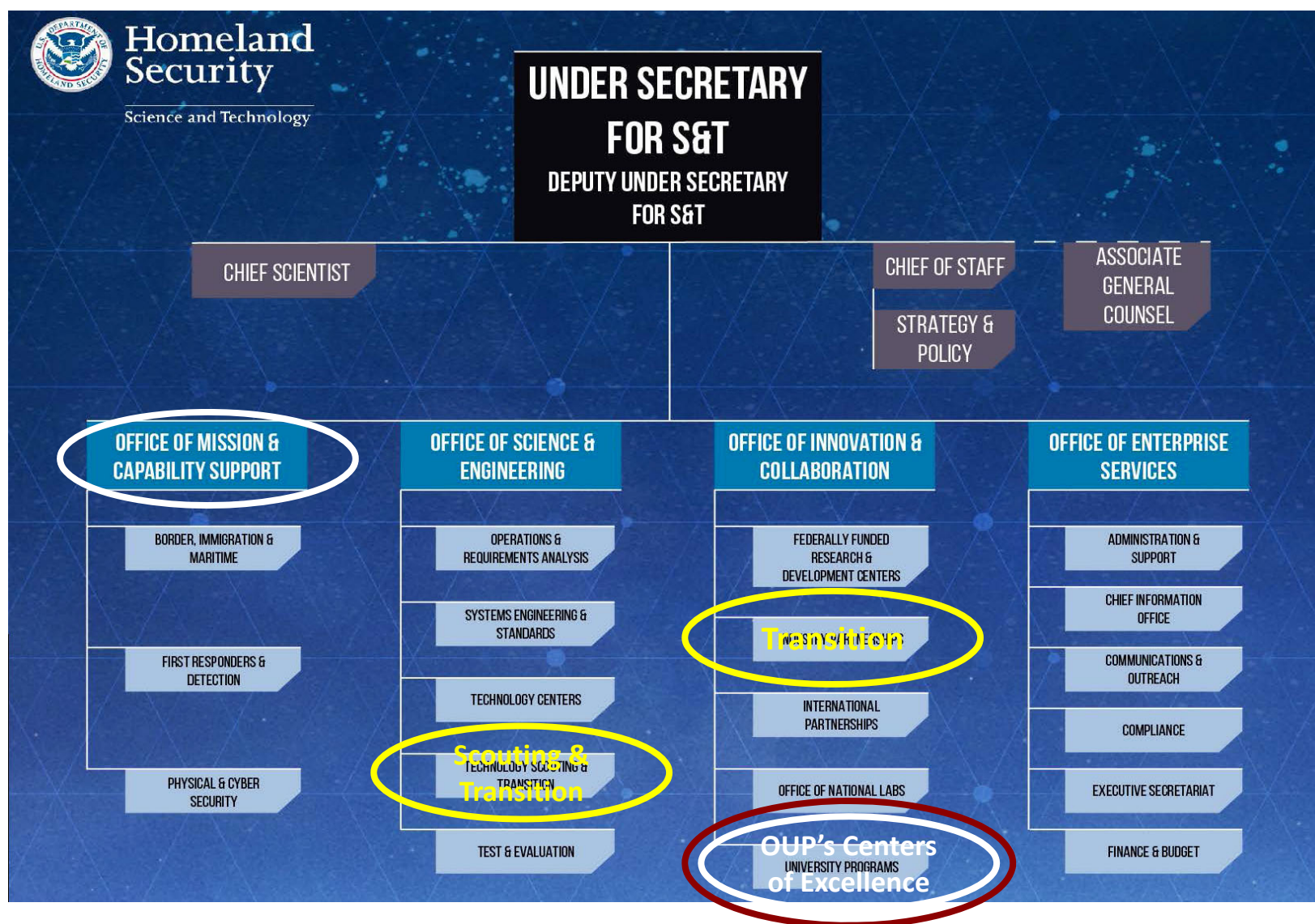
National Science Foundation
2415 Eisenhower Avenue
Alexandria, Virginia 22314
TEL: 703.292.5111 | FIRS: 800.877.8339 | TDD: 800.281.8749

July 2020

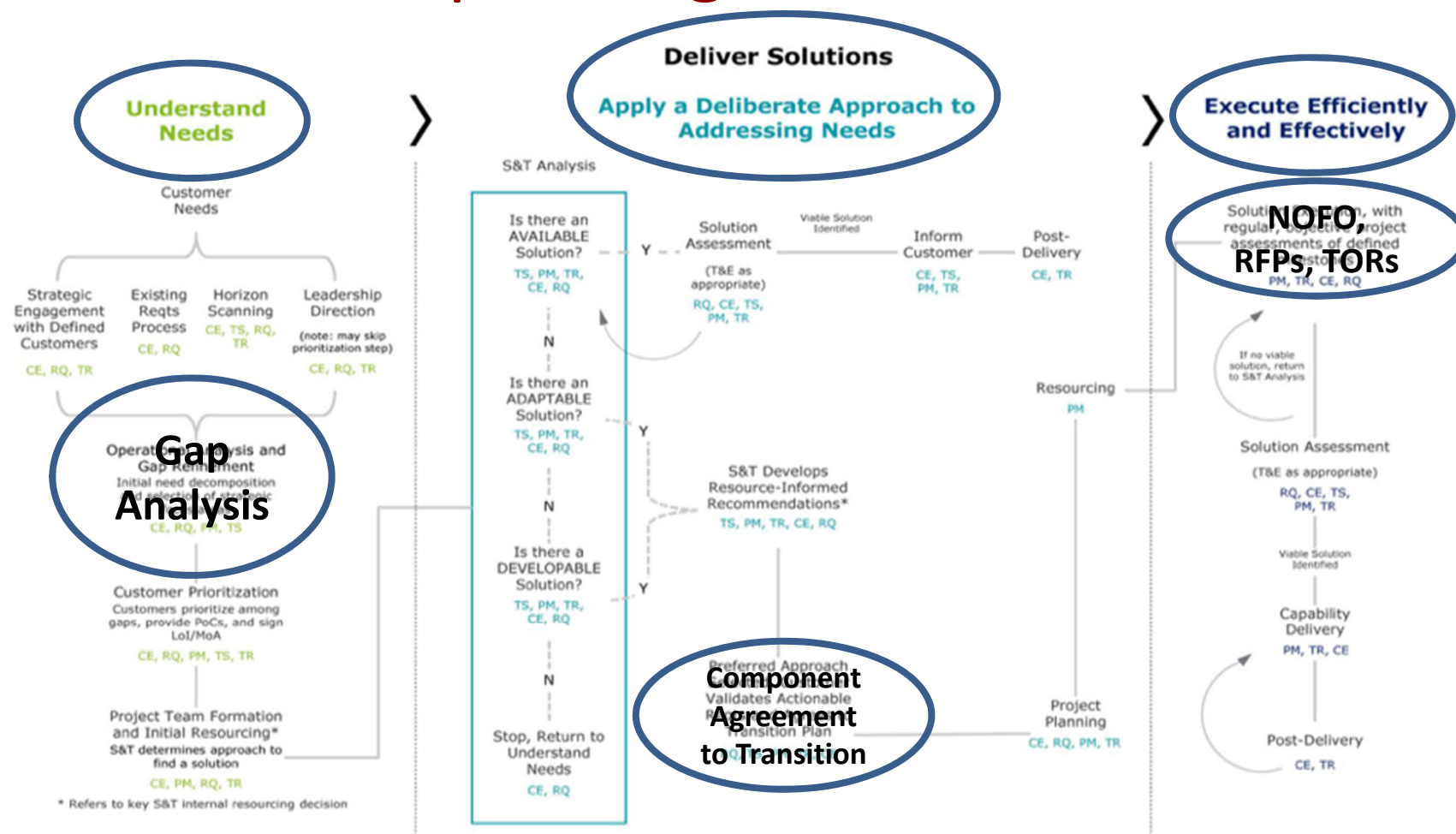
DHS Organizational Chart



DHS S&T Organizational Chart



How Does S&T Determine What R&D to Fund: S&T's Operating Model



Where these elements are involved in the process is indicated by the presence of their initials:
Requirements (RQ), Customer (CE), Tech Scouting (TS), Program Management (PM), and Transition (TR).



Current DHS Funding Opportunities

1. [COVID-19](#): Rapidly expanding portfolio, partnering opportunities, clinical evaluation support
2. [S&T's Long-Range BAA](#) (Broad Agency Announcement): standing invitation for R&D proposals to solve homeland security problems
3. [Prize Competitions](#)
4. [SVIP](#) – Silicon Valley Innovation Program: Leveraging the innovation community to tackle the hardest problems faced by DHS and the HSE
5. [SBIRs](#) – Small Business Innovation Research Program: for small businesses to develop innovative solutions to homeland security needs
6. [SAFETY Act](#) – Incentives for the development and deployment of anti-terrorism technologies by creating systems of risk and litigation management



Current DHS Funding Opportunities

- [COVID-19](#): Rapidly expanding portfolio, partnering opportunities, clinical evaluation support
 - AOI 7.7.1 Diagnostic assay for human coronavirus using existing FDA-cleared platforms
 - AOI 7.7.2 Point-of-care diagnostic assay for detection of SARS-CoV-2 virus
 - AOI 7.7.3 Diagnostic assay for detection of COVID-19 disease (SARS-CoV-2 infection), Including Serology Tests
 - [NEW] AOI 7.7.4 Diagnostic Assay for SARS-CoV-2 as part of FDA-cleared panel for influenza and other respiratory viruses using FDA-cleared platforms
 - AOI 8.3 COVID-19 Vaccine
 - AOI 9.2 COVID-19 Therapeutics
 - AOI 10 Respiratory protective devices
 - AOI 17 Advanced Manufacturing Technologies



Current DHS Funding Opportunities

- [S&T's Long-Range BAA](#) (Broad Agency Announcement): standing invitation for R&D proposals to solve homeland security problems –
Research Areas
 - Securing Aviation
 - Protecting from Terrorist Attacks
 - Securing Borders
 - Securing Cyberspace
 - Preventing Terrorism
 - Managing Incidents
 - Securing Critical Infrastructure



Current DHS Funding Opportunities: S&T's Long-Range BAA, Priority R&D Needs

- High-Throughput Cargo Screening
- Cost-effective Electronic Imaging for Bulk Air Cargo
- Passenger Identification and Vetting
- Rapid Detection and Alarming of Explosives
- Distinguishing Threats from Non-threats on Passengers
- Efficient and Accurate Detection of Complex Threat Concealment on Passengers and Carried Property
- Personal Protective Equipment for all CBRNE Hazards
- Modeling and Predictive Analytics for Decision Making
- Disease and Biological Threat Detection, Identification, and Classification in Field Operational Environments
- Biological Attack Verification
- Cross-border Tunnel Detection, Surveillance, and Forensics
- Infrastructure Tunnel Surveillance
- Integrated and Improved Sensors, Systems, and Data
- Actionable Intelligence Gathering and Sharing
- Dark Aircraft and Vessel Detection, Tracking, and Interdiction
- Expedited People Screening
- Maritime Surveillance and Communications in Remote Environments
- Distributed Cloud-based Communications and Monitoring - Associated/Related Efforts
- Human Aspects of Cybersecurity-Associated/Related Efforts
- Network and Systems Security-Associated/Related Efforts
- Mobile Security-Associated/Related Efforts
- Critical Infrastructure - Associated/Related Efforts
- Software Assurance - Associated/Related Efforts
- Cyber Security Outreach - Associated/Related Efforts
- Cybersecurity for Law Enforcement-Associated/Related Efforts
- Cyber Enabled Networked Physical Systems Security
- Organic Explosive Compound and Homemade Explosives Detection
- Improvised Explosive Device-related Anomaly Detection
- Automated Machine Learning
- Prevention
- Advanced Analytics
- Situational Awareness
- Communications
- Command, Control, Communications
- Training and Exercises
- Responder Health, Safety, Performance
- Logistics and Resource Management
- Casualty Management
- Risk Assessment and Planning
- Intelligence and Investigation
- Dependency and Interdependency Analysis
- Risk-Informed Prioritization



Current DHS Funding Opportunities

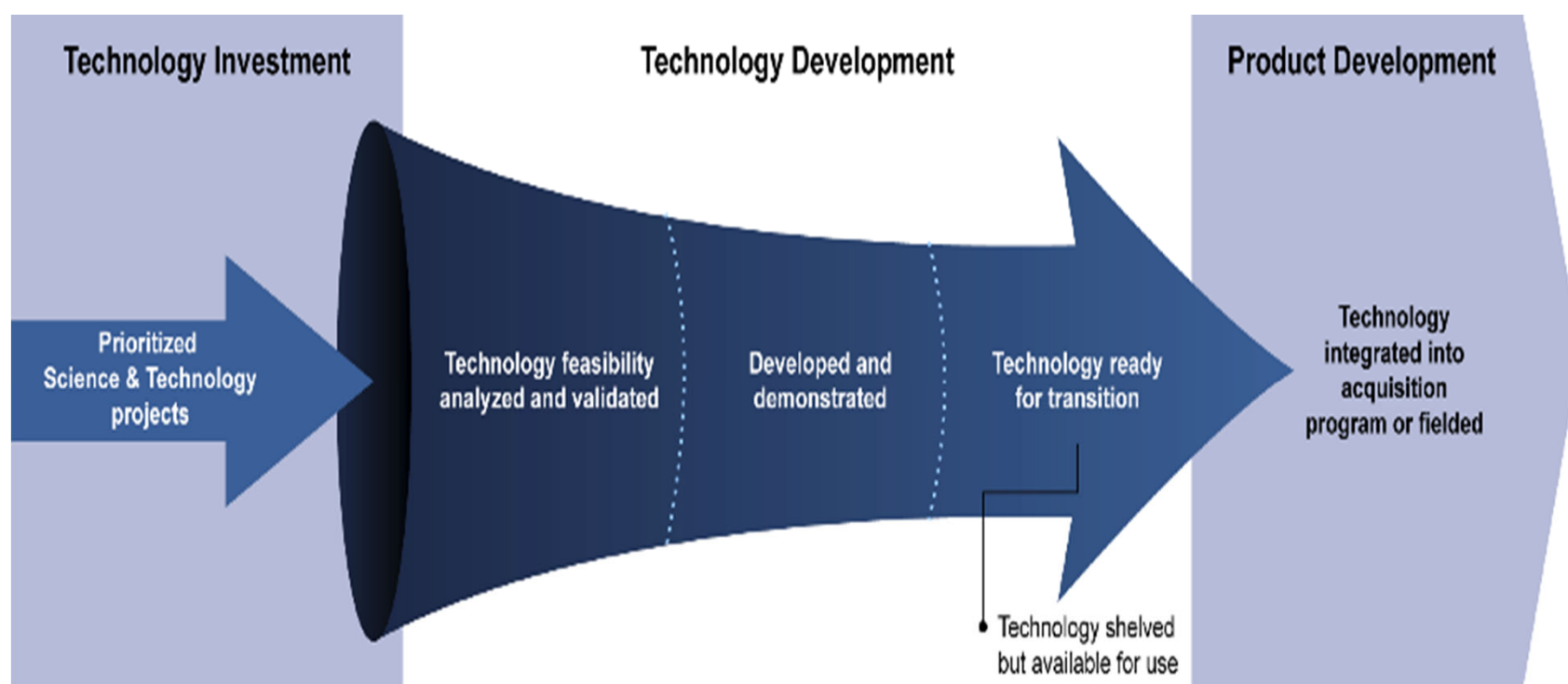
- [Prize Competitions](#)
 - Challenges Under Way (winners awarded)
 - [Opioiod Detection Challenge](#)
 - [Escape Respirator Challenge](#)
 - Past Prize Challenges
 - [15-01: Where Am I? Where is My Team?](#)
 - [15-02: NBAF Think and Do Challenge](#)
 - [15-03: Environmentally Friendly Replacement of Buoy Mooring Systems](#)
 - [Passenger Screening Algorithm Challenge](#)
 - [Hidden Signals Prize Challenge](#)
 - [Ready For Rescue Prize Challenge](#)



Research Results to Transition Pathways

- Transition Processes and TRLs
- Stage Gates
- OUP and CREATE Processes
- Commercialization, Industry Engagement, and Licensing/Business Planning
- Faculty Examples
 - PortSec, USMC Harrier (non-CREATE)
 - MANPADS
 - ARMOR

R&D Project-to-Product Transition Process



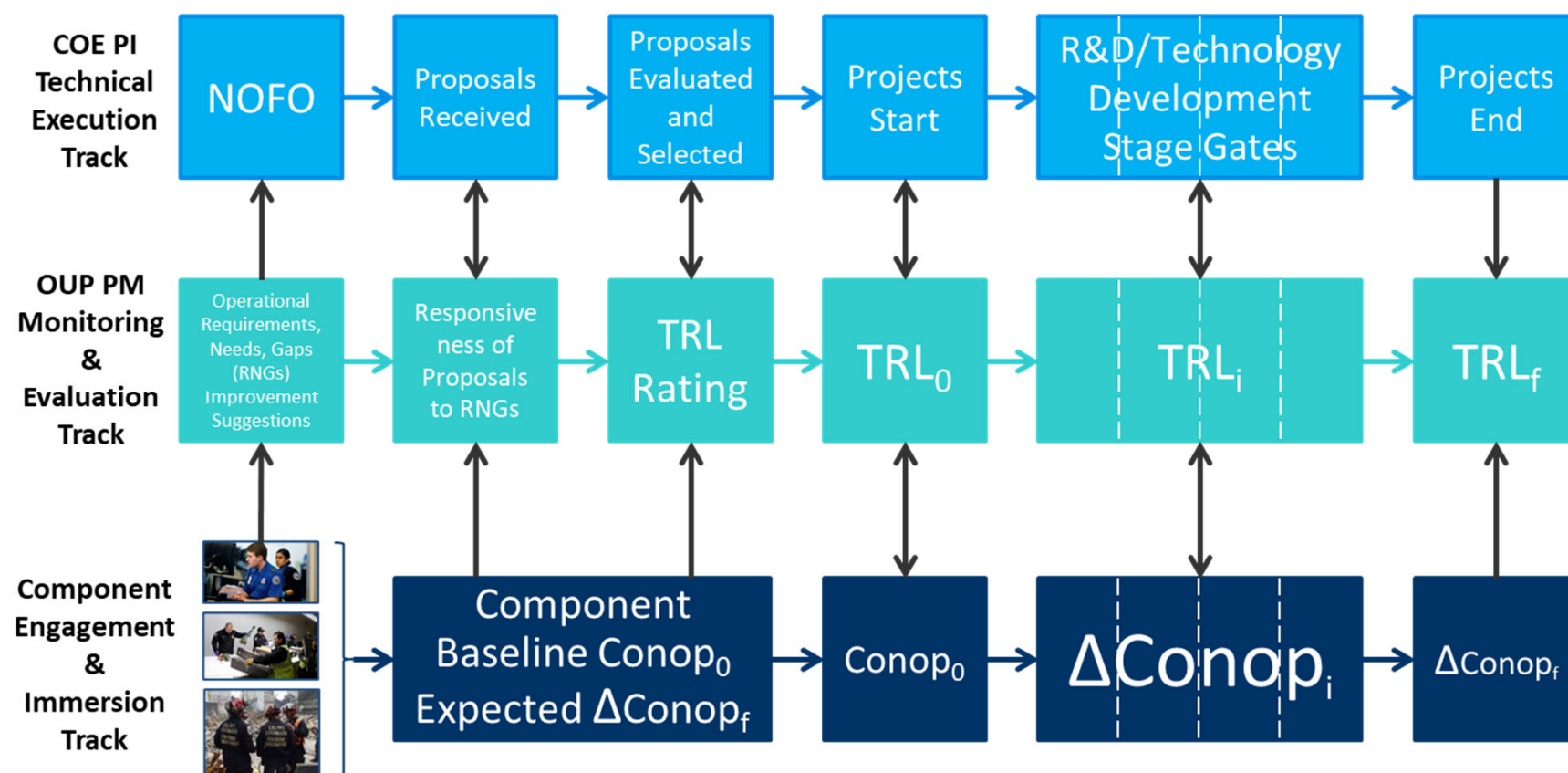
Source: GAO analysis of Department of Defense science & technology management process. | GAO-16-5

Technology Readiness Levels (TRL)

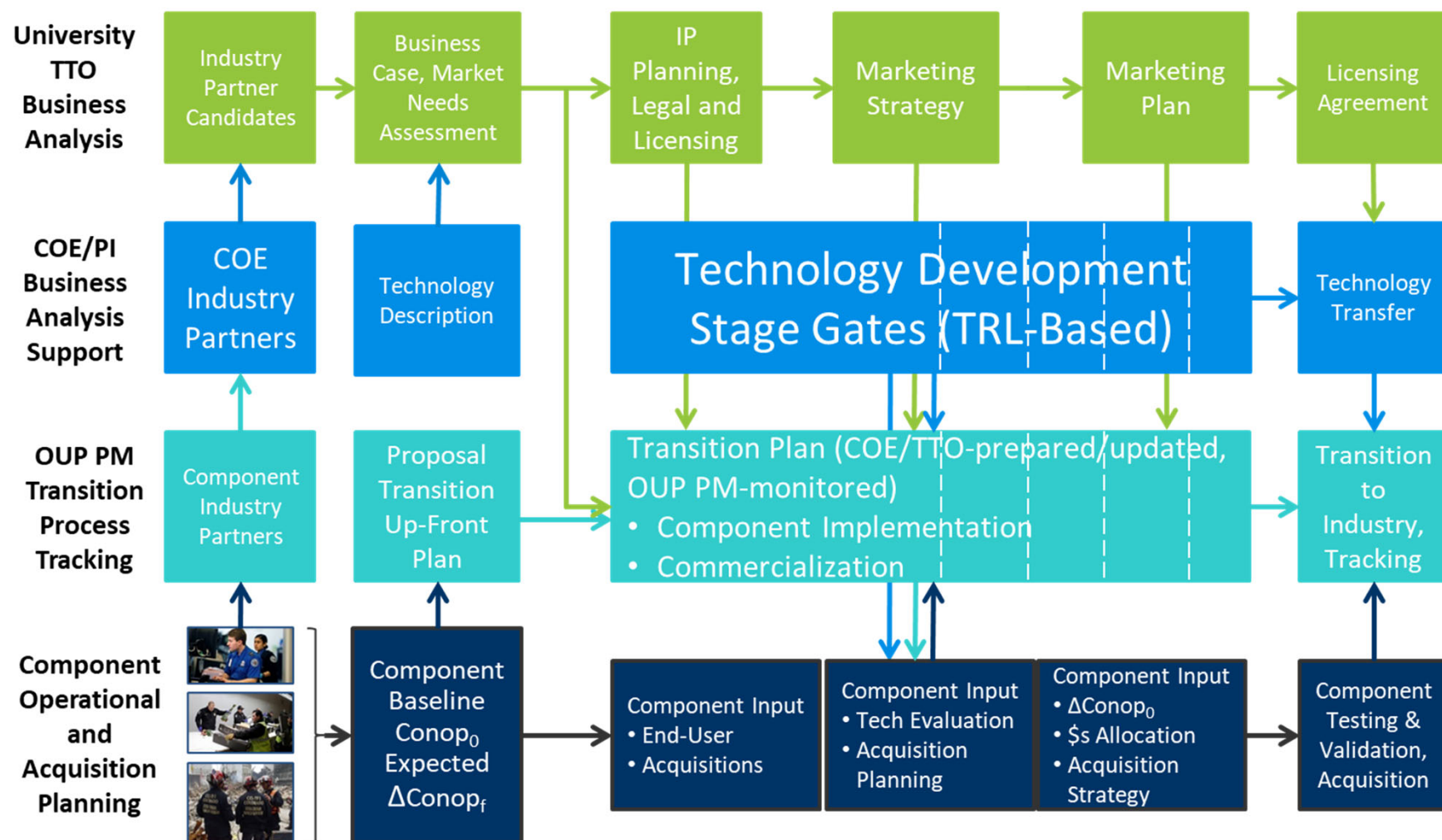
DEPLOYMENT	9	ACTUAL SYSTEM PROVEN IN OPERATIONAL ENVIRONMENT
	8	SYSTEM COMPLETE AND QUALIFIED
	7	SYSTEM PROTOTYPE DEMONSTRATION IN OPERATIONAL ENVIRONMENT
	6	TECHNOLOGY DEMONSTRATED IN RELEVANT ENVIRONMENT
DEVELOPMENT	5	TECHNOLOGY VALIDATED IN RELEVANT ENVIRONMENT
	4	TECHNOLOGY VALIDATED IN LAB
	3	EXPERIMENTAL PROOF OF CONCEPT
	2	TECHNOLOGY CONCEPT FORMULATED
	1	BASIC PRINCIPLES OBSERVED
RESEARCH		

<https://www.twi-global.com/technical-knowledge/faqs/technology-readiness-levels>

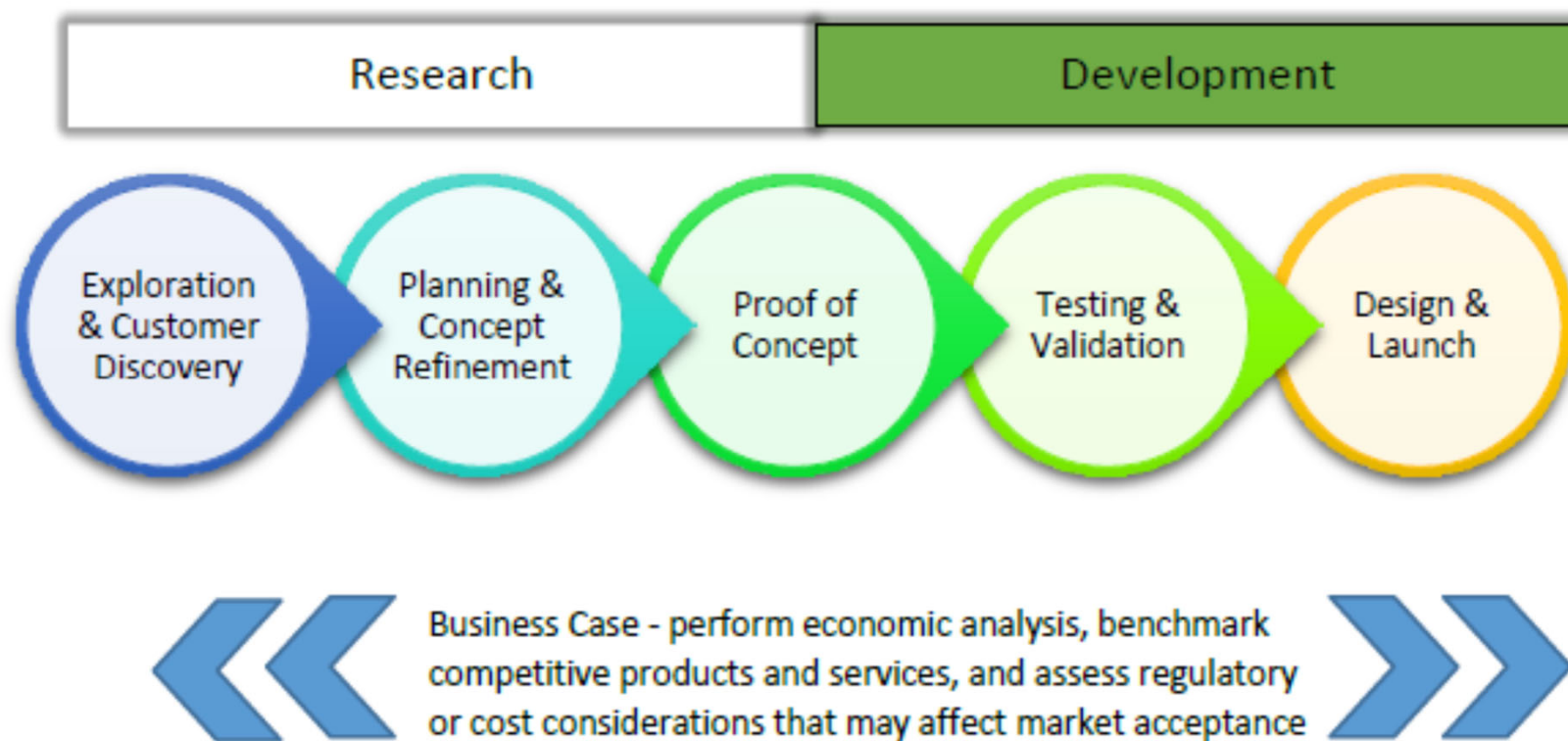
Research Transition Pathway: Technical Track



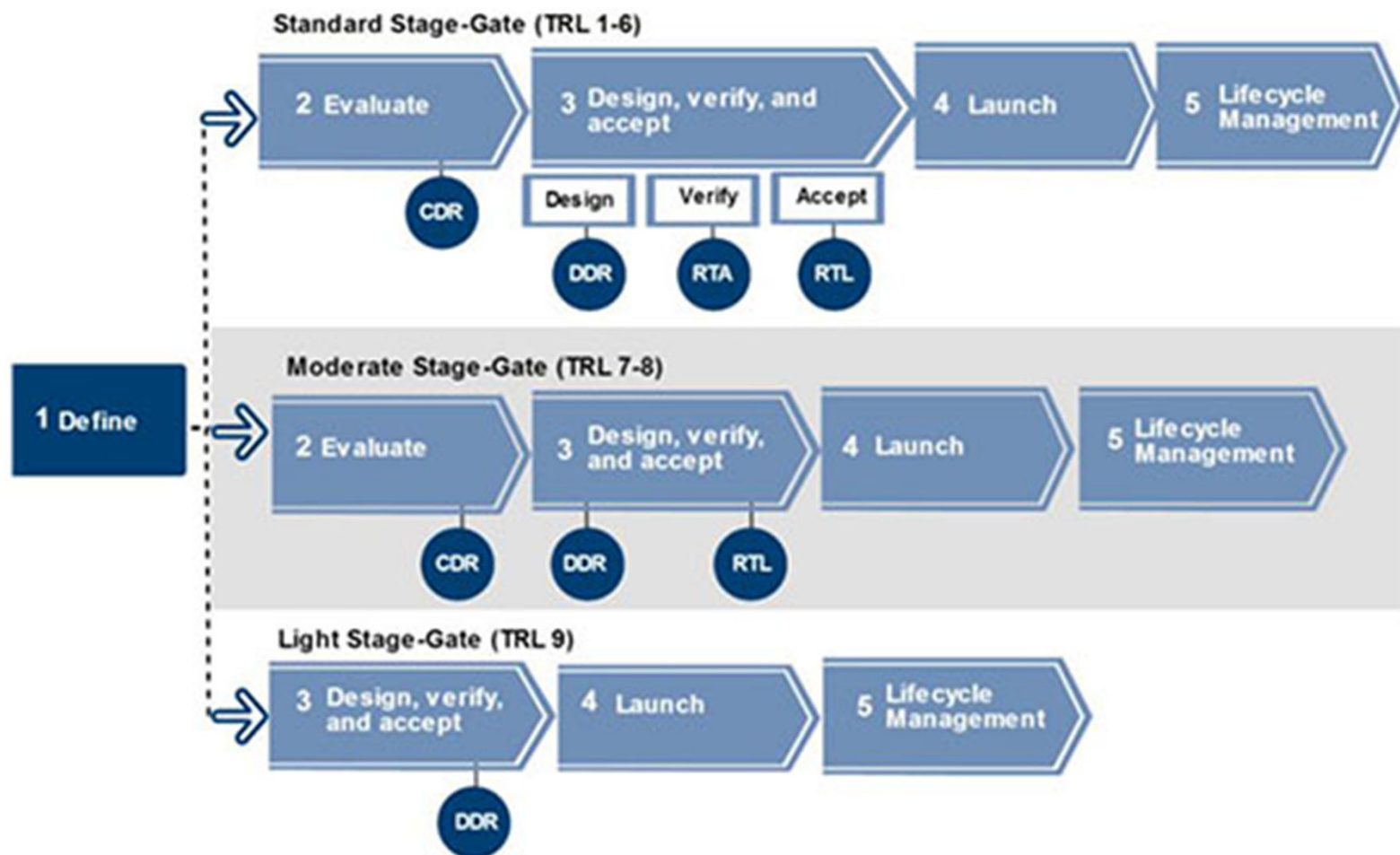
Research Transition Pathway: Business Track



Research Transition Pathway: Stage Gates

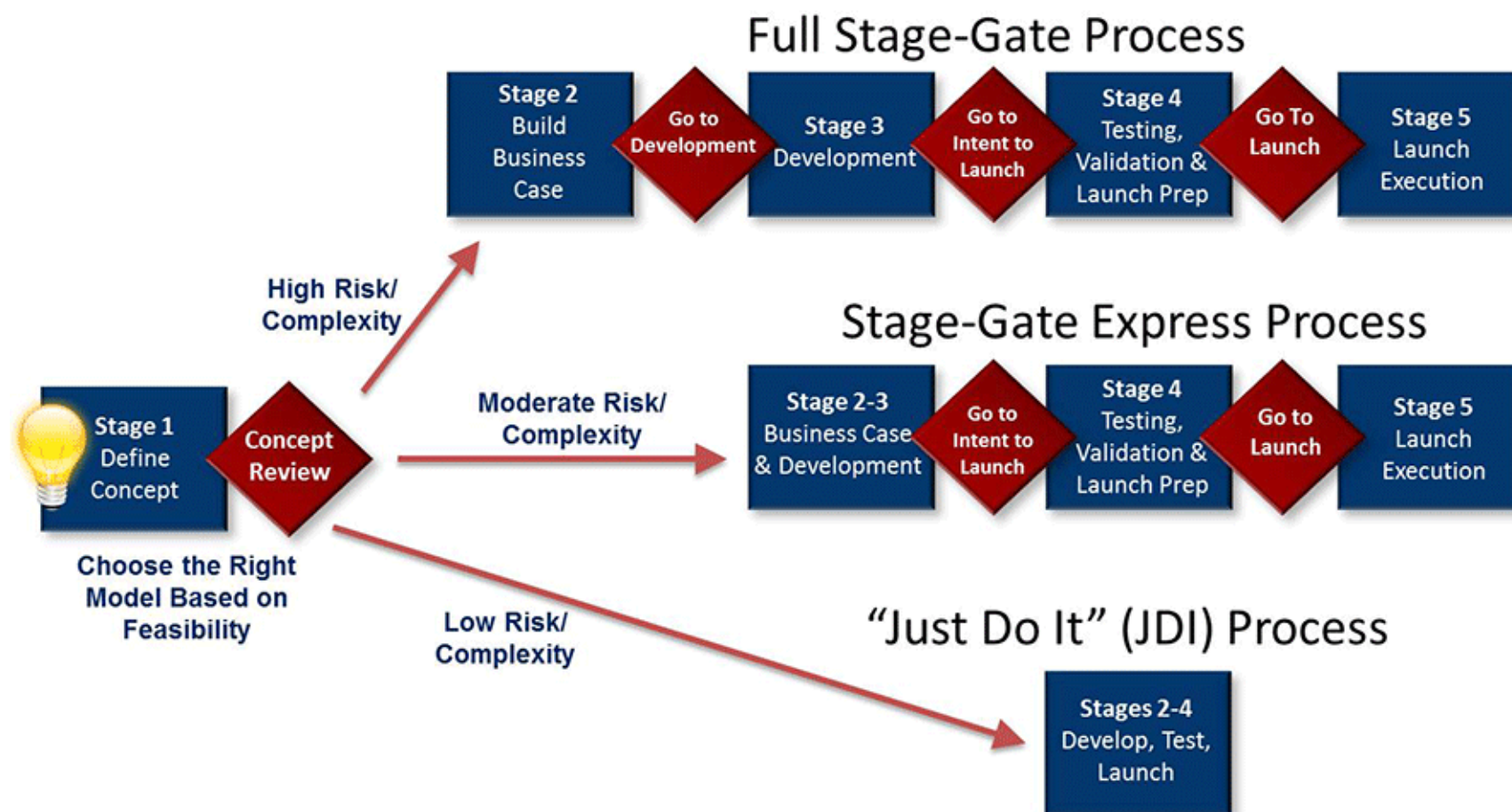


Research Transition Pathway: TRL-Based Technical Stage Gates



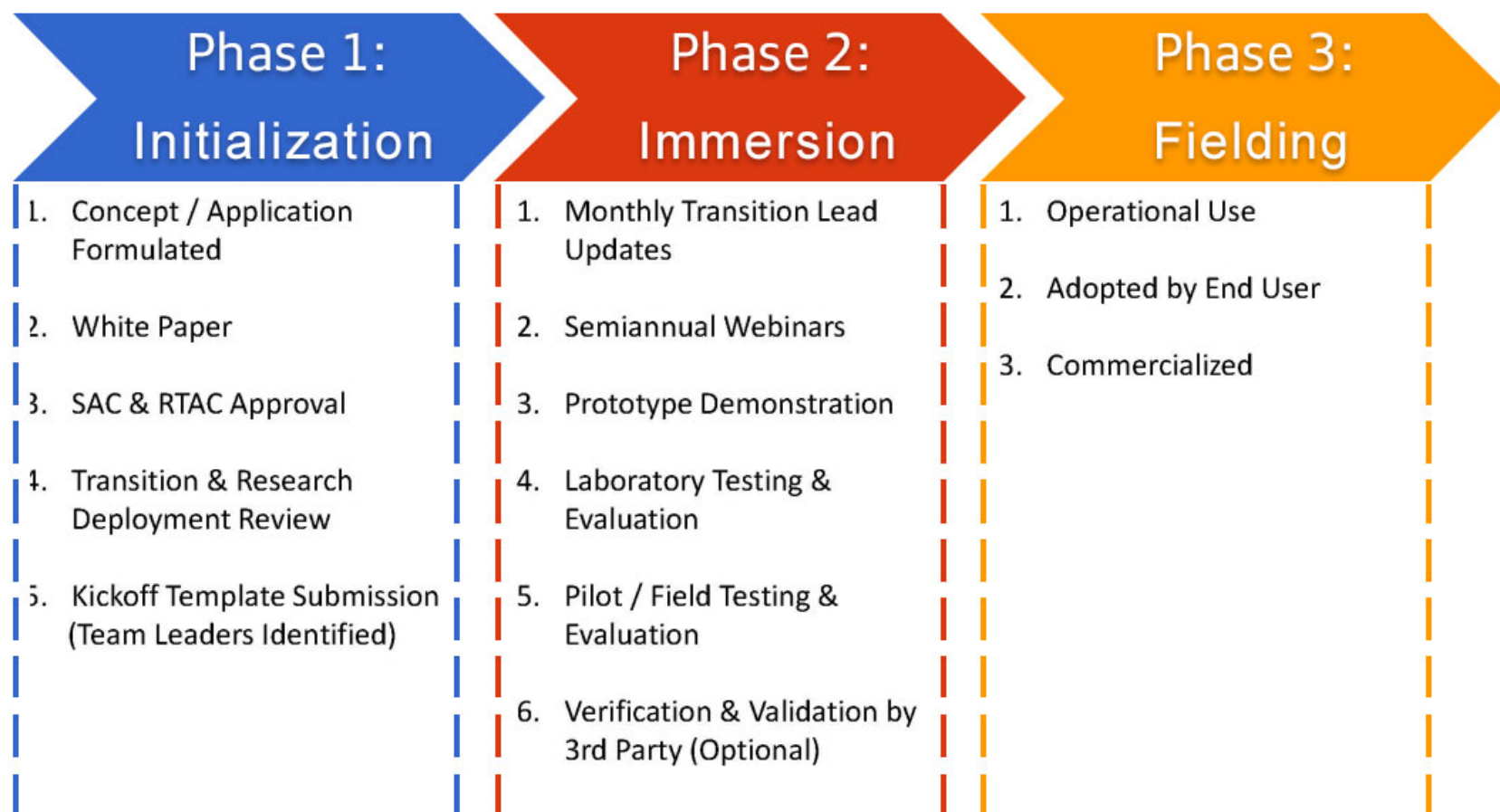
<https://www.industryweek.com/leadership/change-management/article/21963526/how-to-use-a-stagegate-process-to-manage-organizational-change>

Research Transition Pathway: Business Stage Gates

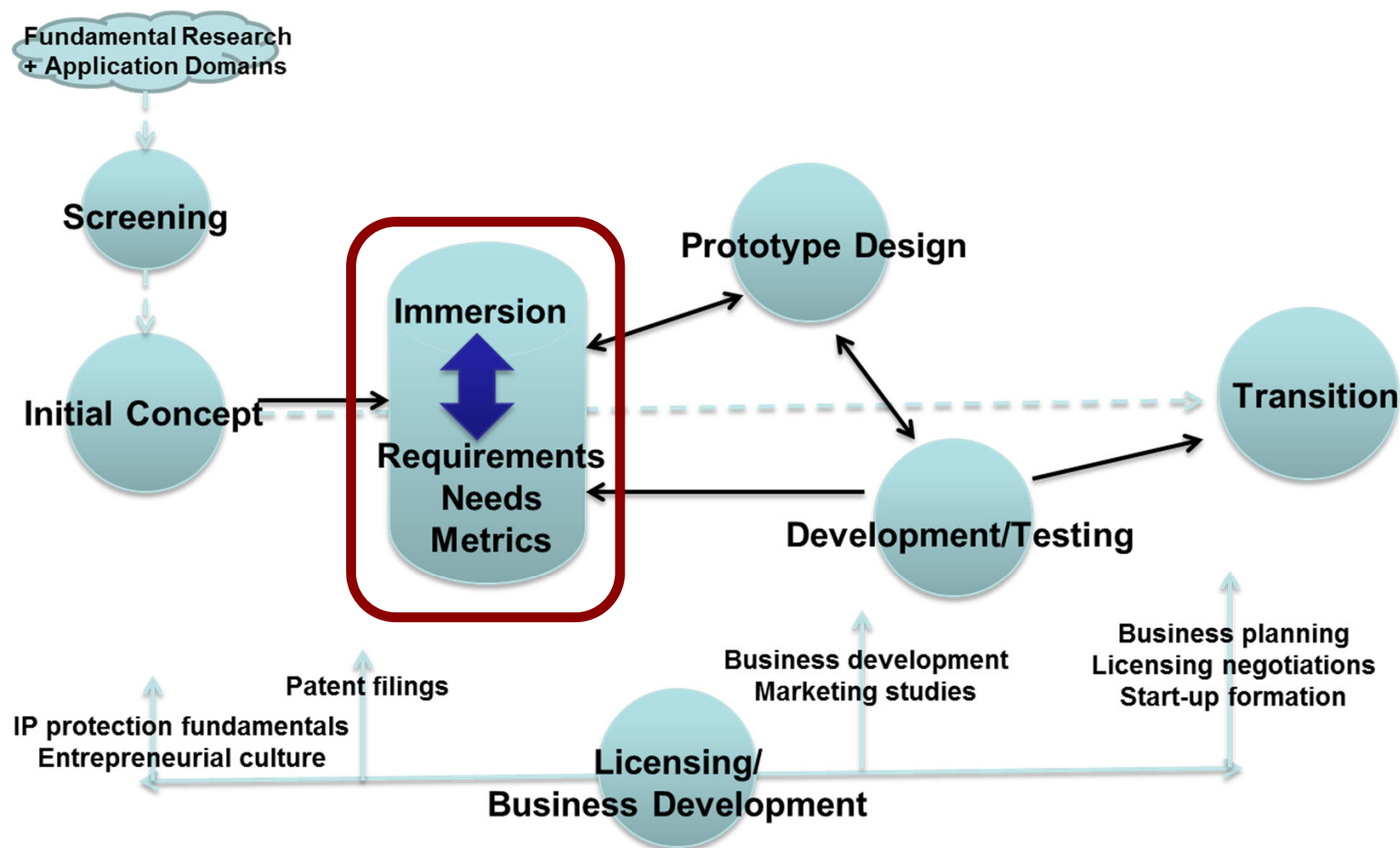


<https://www.sopheon.com/stage-gate-innovation/>

CREATE's Research Transition Pathway



CREATE's Research Transition Pathway



Application Domain Partners

- USCG
- TSA
- FAMS
- CBP
- DNDO
- ICE
- LAX International Airports
- Ports of LA & LB
- Cal OES / CalEMA / CA OHS
- LA County Sheriffs Dept.
- CA Dept of Corrections
- JRIC
- Ohio Highway Patrol
- CEC



Transportation
Security
Administration





Transitioned CREATE Projects

- **ARMOR*** – Game Theory-based resource allocation
- **DET** – Dirichlet expert elicitation and aggregation tool for risk analysis
- **E-CAT** – Economic consequence analysis tool
- **EQ Rapid Estimation** – Economic consequence estimating tool
- **MANPADS*** – Risk analysis of surface-to-air missile attacks
- **PortSec*** – Port (POLA/LB) risk assessment and resource allocation analysis tool

*** Project transition presentation to follow**



Research Transition/Application Impact

“**CREATE** has provided several very timely, relevant deliverables to the Counter-**MANPADS** Systems Program Office As the program has progressed, there has been a growing need to show the benefits relative to the costs of outfitting the commercial aircraft fleet with such technologies The CREATE products, which include an economic analysis of the indirect costs associated with a successful MANPADS attack, have helped fill this void.” (Counter-MANPADS Program Office, email message from Kurt Wohlstaetter to Detlof von Winterfeldt)

Director of the MANPADS Systems Program Office

“We have tested IRIS and...**have continued to expand the number of flights scheduled using IRIS**. Our exact use of IRIS is sensitive information and we can only state that we are **satisfied with IRIS and confident in using this scheduling approach.**”

James B. Curren, Special Assistant, Office of Flight Operations
Federal Air Marshals Service (FAMS)

Value of Transitioning Products: CREATE's Landscape Project – Costs, Medians, Ranges of Net Present Values

Updated June 7, 2018		Ranges of Net Present Values (in 2017 \$1000)			
Tool, Technology, or Knowledge Product (TTKP)	Cost (in 2017 \$1000)	Low NPV (5th Percentile)	Median NPV (50th Percentile)	High NPV (95th Percentile)	Years of Use for Net Benefit Calculations
TTKPs with Past Applications					
PROTECT	\$710	\$20,500	\$35,505	\$58,798	6 Past & 4 Future Years
ARMOR	\$1,056	\$25,428	\$28,969	\$32,229	10 Years, Past Use
CgSARVA	\$803	\$570	\$5,247	\$13,170	One Time (Sandy)
TTKPs with Potential Future Applications					
ADCIRC	\$7,095	\$101,934	\$286,209	\$562,793	10 Years, Future Use
Engineered Swabs	\$1,867	(\$77,597)	\$22,528	\$159,825	10 Years, Future Use
GeoXray	\$273	\$8,425	\$18,404	\$35,212	10 Years, Future Use
TraffiCop	\$1,413	\$3,214	\$10,444	\$24,562	10 Years, Future Use
Hoax Calls	\$183	\$1,731	\$4,646	\$9,442	10 Years, Future Use
BOARD	\$1,018	\$239	\$2,435	\$7,902	10 Years, Future Use
E-CAT	\$945	(\$416)	\$806	\$2,603	10 Years, Future Use
TOTAL	\$15,363	\$84,027	\$415,193	\$906,536	



Commercialization, Industry Engagement, and Licensing/Business Planning Issues

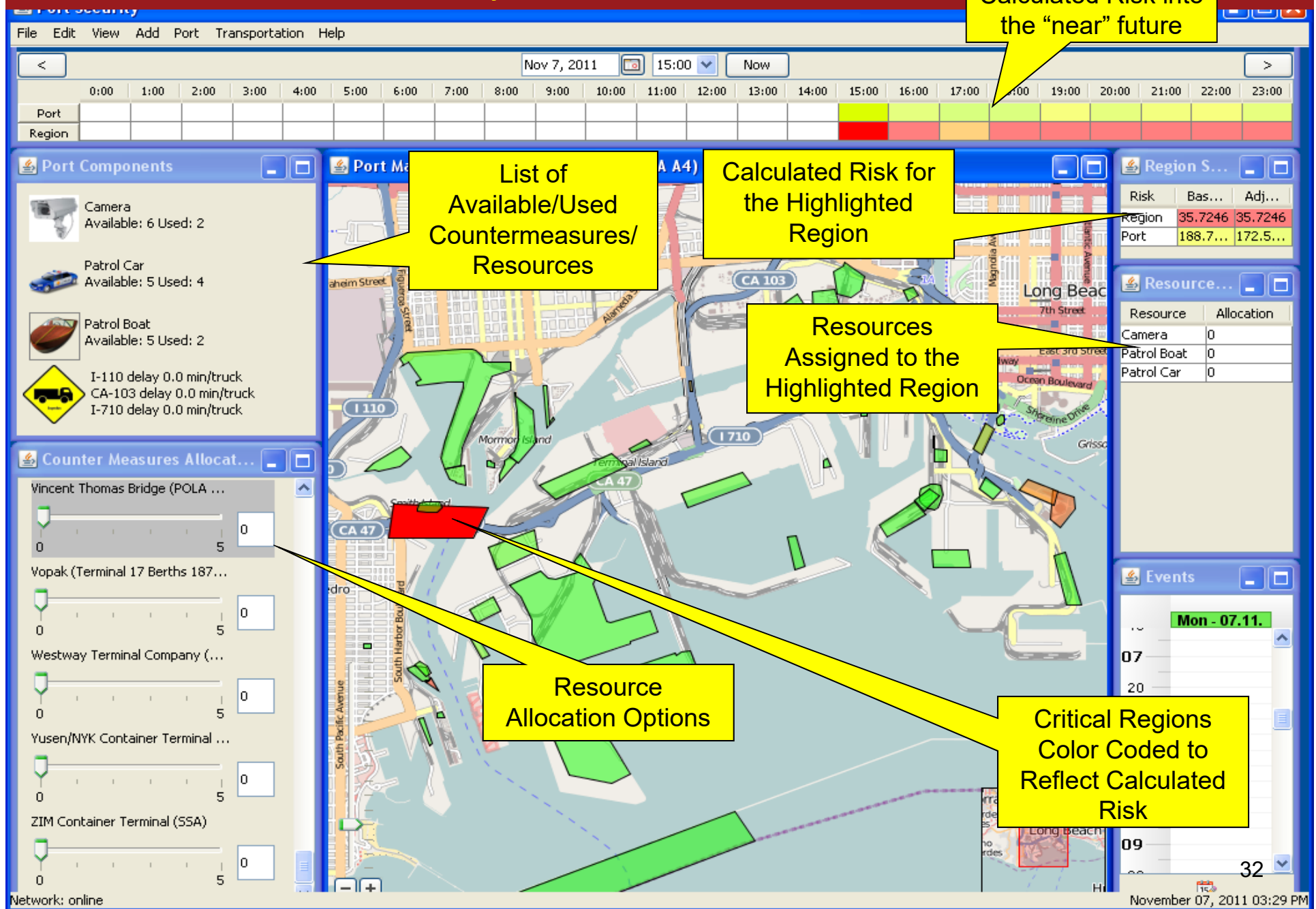
- Commercialization
 - HSE domain, small/captive market
 - Non-HSE domain, large, competitive markets
- Industry Engagement
 - Established and/or large companies, market leaders
 - Small start-ups/disruptors
- Licensing/Business Planning
 - To Patent or Not to Patent
 - Business-side, university-based support



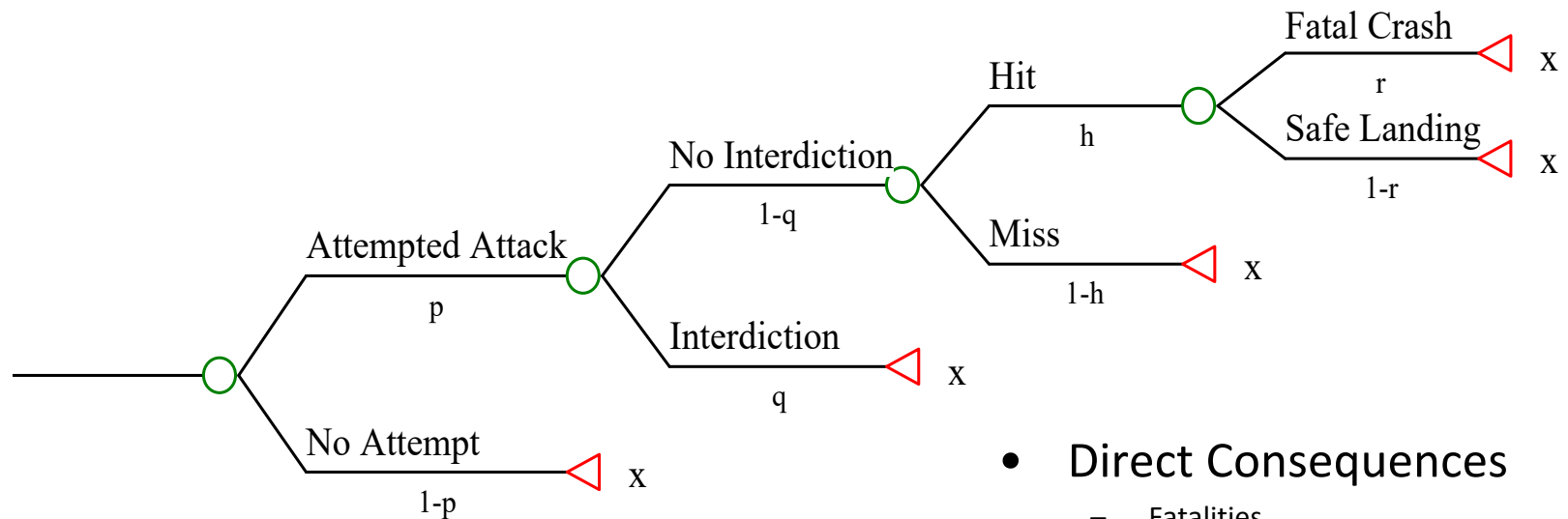
R&D Project Transition Examples

- **ARMOR**
Milind Tambe, PhD
Research Adjunct Professor of Computer Science
- **MANPADS**
Detlof von Winterfeldt, PhD
J.A. Tiberti Chair in Ethics and Decision Making, and
Professor of Industrial and Systems Engineering and
Policy, Planning and Development
- **PortSec and USMC Harrier (non-CREATE)**
Michael Orosz, PhD
Research Associate Professor of Civil and
Environmental Engineering and Spatial Sciences
USC-ISI Principal Investigator

PortSec: Risk Analytics Visualization



MANPADS: Application of Decision Trees (Nuclear Industry)



- Direct Consequences

- Fatalities
- Loss of Airplane
- Injuries

- Indirect Consequences

- Aviation System Shutdown
- Reduced Airline Passenger Volume
- Fears and worries

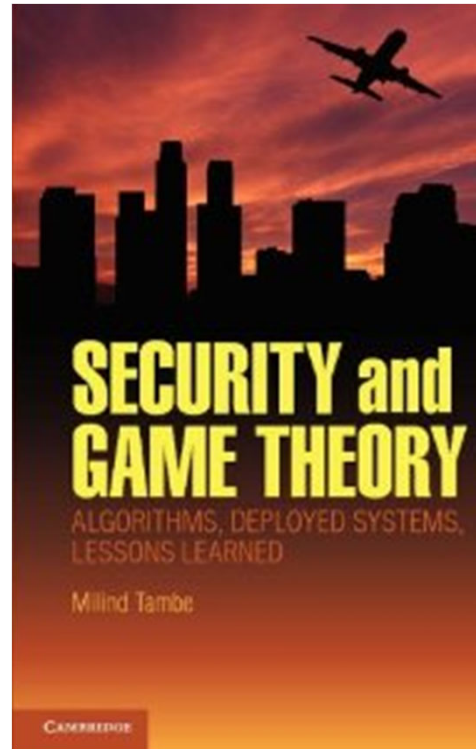
ARMOR: Game Theory Applications



ARMOR - LAX



ARMOR – GUARDS: TSA



ARMOR – IRIS: FAMS



ARMOR – PROTECT: USCG



ARMOR's Key Steps

Technical

- Pre- and Co-CREATE funding for fundamental R&D through early development
- Insightful technology application in critically needed domains
- Early adopters and immersion opportunities
- Solid technical performance by PIs and Co-Investigators (PDs, RAs)

Business

- IP Protection via Invention Disclosures (prior to public disclosure,) patents
- Business plan development
- Leveraging USC Stevens and local start-up support
- Graduating students with entrepreneurial interests
- Post-Spinoff nimbleness to pursue developing new markets

Thank You. Questions or Comments?



Isaac Maya, PhD, PE
Associate Director for Transition and Commercialization
imaya@usc.edu, 213-949-6292 (cell)

- Current contributor in two projects for DHS S&T
- DHS S&T IPA Detailee to OUP in DC, 2016-2019
- CREATE's Director of Research, 2005-2016
- Integrated Media Systems Center (IMSC) Director of Industry and Technology Transfer Programs, 1998-2005
- Start-up Executive Management experience