



***Superior Options for Long-life Solar Technologies with Impressive Conversion Efficiencies***  
**PROPOSER'S DAY**

Dr. Brian Borak | Program Manager | May 7, 2024



Intelligence Advanced Research Projects Activity

**IAIRPA**

Creating Advantage through Research and Technology



# Welcome to the SOLSTICE Proposers' Day



- Thank you for your interest in the IARPA SOLSTICE program and participating in this event!
- To assure a clear broadcast stream, audio and video are disabled for meeting participants
- Comments and questions can be submitted to the IARPA team via the SOLSTICE email alias: [dni-iarpa-solstice-proposersday@iarpa.gov](mailto:dni-iarpa-solstice-proposersday@iarpa.gov)
  - Please do NOT direct questions through the chat function or through other means
- Questions submitted to the email alias prior to this meeting and during this presentation, and corresponding answers, may be posted in writing online



# Disclaimers



- This presentation is provided solely for information and planning purposes
- The Proposers' Day does not constitute a formal solicitation for proposals or proposal abstracts
- Nothing said at this Proposers' Day changes the requirements set forth in a BAA
- **The BAA language supersedes anything presented or said by IARPA at the Proposers' Day**
- This meeting is being recorded and will be posted for public viewing
- For those viewing the recording, email aliases and POCs may be dated. Please refer to [IARPA.gov](http://IARPA.gov) for updated information.



# Proposers' Day Goals



1. Familiarize participants with IARPA's interest in the SOLSTICE program and solicit questions and feedback
2. Foster discussion of complementary capabilities among potential program participants, i.e., TEAMING
  - Teaming information can be found at the following address: <https://www.iarpa.gov/index.php/research-programs/SOLSTICE>
  - An attendance list, with contact information of participants who approved of sharing will be distributed
  - The chat feature is enabled for participants to plan future discussions associated with teaming
  - Teaming interests, capability summaries, and lightning talk slides will be posted publicly on the IARPA SOLSTICE webpage until the BAA submission period closes

Please ask questions and provide feedback, this is your chance to alter the course of events.  
Please talk with others, find great team members.



# Feedback and Questions



- Questions can be submitted until 11:15 am ET
- There will be a break after the contracting presentation at 11:30 am ET
- Responses to selected questions will be broadcast at 1:00 pm ET, so please don't log out or close your WebEx connection
  - All programmatic and contractual questions will be captured but will not be answered in this session
- Feedback (but not questions) about the draft technical section may be submitted to the IARPA team email at [dni-iarpa-solstice-proposersday@iarpa.gov](mailto:dni-iarpa-solstice-proposersday@iarpa.gov)
  - A new alias will be established when the full BAA is released
- After this Proposers' Day, IARPA will review all the feedback received prior to a final BAA posting on SAM.gov and Grants.gov



# Teaming



- Participants are encouraged to find partners and collaborators . . . someone might have a missing piece of your puzzle
- Note that FFRDCs, UARCs, and other organizations that have a special relationship with the government may NOT serve as part of a Performer team
- Lightning talks will take place following the Program presentations
- Collaboration and capability summaries will be accepted, with minimal review for appropriateness, and made available to the public
- Teaming documents and summaries can be submitted until the BAA closes. Submit to [dni-iarpa-solstice-proposersday@iarpa.gov](mailto:dni-iarpa-solstice-proposersday@iarpa.gov)
  - If you would prefer your information not be shared (any recorded videos cannot be modified or removed) email [dni-iarpa-solstice-proposersday@iarpa.gov](mailto:dni-iarpa-solstice-proposersday@iarpa.gov)



# Agenda



Time	Topic	Speaker
10:00 a.m. – 10:10 a.m. EDT	Welcome, Logistics, Proposers' Day Goals	Brian Borak, Program Manager
10:10 a.m. - 10:20 a.m.	IARPA Overview	Richard Muller, IARPA Director
10:20 a.m. - 11:00 a.m.	SOLSTICE Program Overview	Brian Borak
11:00 a.m. - 11:20 a.m.	Contracting Overview	Frank Kennedy, DOI CO
11:30 p.m. - 1:00 p.m.	<b>Break (Submit questions to email by 11:30 a.m.)</b>	
1:00 p.m. - 2:00 p.m.	Answers to Selected Technical Questions	Brian Borak
2:00 p.m. - 2:05 p.m.	Introduction to Lightning Talks	Brian Borak
2:05 p.m. - 4:00 p.m. (est.)	Lightning Talks*	Potential Performers
4:00 p.m. - 5:00 p.m.	Informal Teaming Discussions*	In-Person Participants

\*The Government will not attend these events



# In-Person Lightning Talks Agenda



Time	Speaker	Institution
2:05 PM	Rajib Datta	GE Vernova Advanced Research
2:10 PM	Noren Pan	MicroLink Devices
2:15 PM	David Grant	Apogee Semiconductor, Inc.
2:20 PM	Wanye Nie	SUNY Buffalo
2:25 PM	Vincent Hearn	Solestial, Inc.
2:30 PM	Luz Martinez-Miranda	U. of Maryland
2:35 PM	Seth Hubbard	Rochester Institute of Technology
2:40 PM	Patrick Maeda	SRI International

No Q&A during this session. Participants should contact presenters directly afterwards





# Webex Lightning Talks Agenda



Time	Speaker	Institution
2:50 PM	Bin Chen	Northwestern U.
2:55 PM	Robert Pilawa-Podgurski	U. of California, Berkeley
3:00 PM	Matt Renola	Vicor Corporation
3:05 PM	Nicholas Rolston	Arizona State U.
3:10 PM	Aswath Pattabi Raman	UCLA
3:15 PM	Colin Bailie	Tandem PV, Inc.
3:20 PM	Todd Otanicar	Boise State U.
3:25 PM	Volodimir Grebenyuk	Ascent Systems Technologies
3:30 PM	Pablo Bueno	SWRI
3:35 PM	Omar Beik	Colorado School of Mines
3:40 PM	Linxiao Zhu	Penn State U.
3:45 PM	Xiaoming Wen	RMIT U.

**No Q&A during this session. Participants should contact presenters directly afterwards**

# IARPA

## High Risk/High Payoff Research for the IC

Dr. Rick Muller | IARPA Director | May 7, 2024



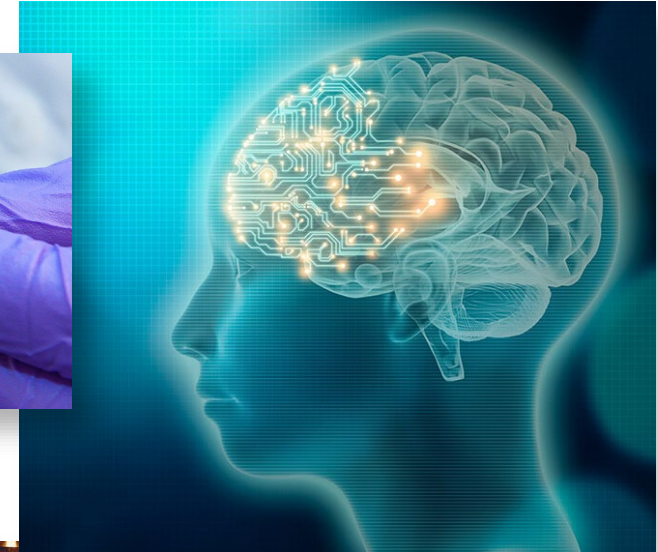
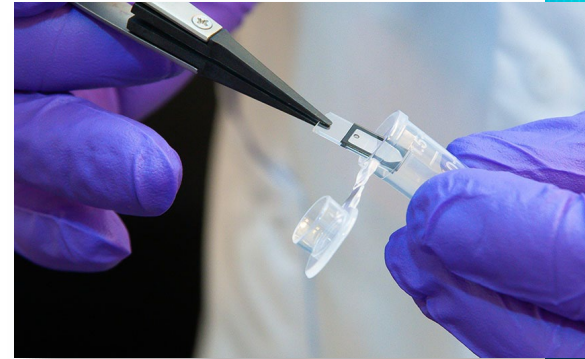
Intelligence Advanced Research Projects Activity

# I A R P A

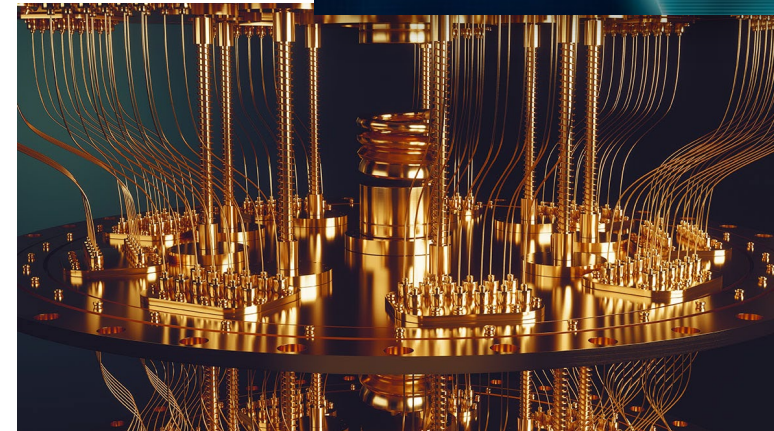
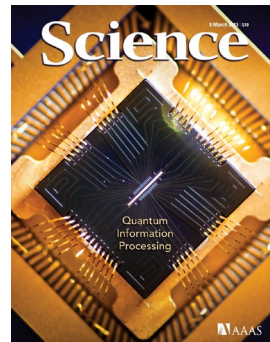
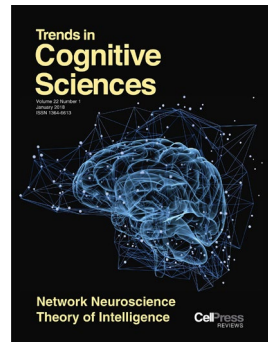
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# HIGH RISK HIGH PAYOFF RESEARCH



IARPA invests in research programs to tackle some of the Intelligence Community's (IC) most difficult challenges



WWW.IARPA.GOV



# IARPA Mission



**IARPA's mission is to invest in high-risk/high-payoff research that has the potential to provide the U.S. with an overwhelming intelligence advantage over our future adversaries**

- **Our problems are complex and truly multidisciplinary**
- **We emphasize Technical Excellence & Technical Truth**
  - Scientific Method
  - Peer/independent review
  - Full and open competition

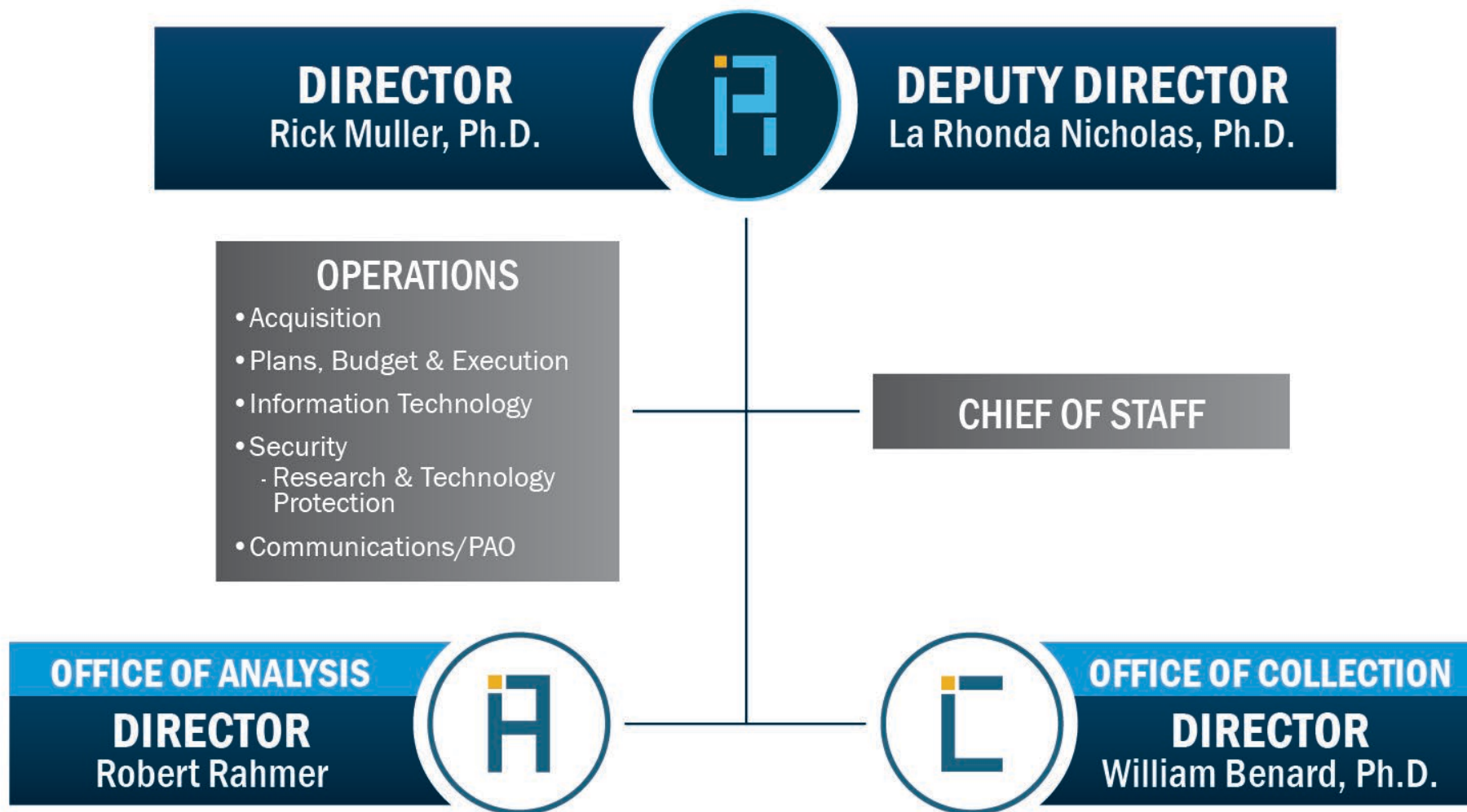


# Chartered to be Different

- **About taking real risk**
  - NOT about “quick wins”, “low-hanging fruit”, “sure things”, etc.
  - Relatively small size
  - Lean, non-bureaucratic structure
- **Failure is completely acceptable as long as...**
  - It is not due to failure to maintain technical and programmatic integrity
  - Results are fully documented
- **Leverage the best and brightest**
  - Focus on potentially change-state technologies
  - Highly flexible and adaptive research program
- Competitive awards and world-class Program Managers.
- Every IARPA program will start with a great idea and a qualified program manager to lead it. Without both, IARPA will not start a program.
- **Maintain a cross-community focus**
  - Address cross-agency challenges
  - Leverage IC partner agency expertise (both operational and R&D)
  - Work transition strategies and plans

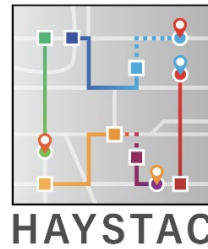
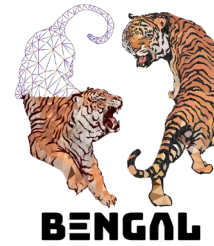


# Organization



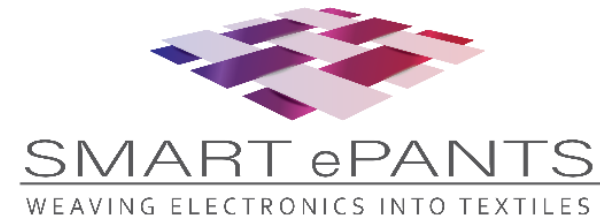
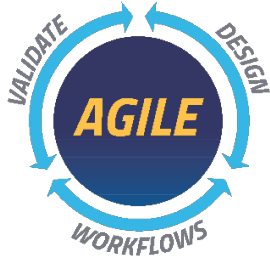


# Office of Analysis





# Office of Collection







# IARPA Method

- Bring the best minds to bear on our problems
  - Full and open competition to the greatest possible extent
  - World-class, term-limited Program Managers
- Define and execute research programs that:
  - Have goals that are clear, ambitious, credible and measurable
  - Run from three to five years
  - Publish peer-reviewed results and data, to the greatest possible extent
  - Employ independent and rigorous Test & Evaluation
  - Involve IC partners from start to finish
  - Transition new capabilities to intelligence community partners



# IARPA R&D



- **Technical and programmatic excellence are required**
- **Each program has a clearly defined and measurable end-goal**
  - Intermediate milestones to measure progress are also required
  - Every program has a beginning and an end
- **This approach, coupled with term-limited PM positions, ensures**
  - IARPA does not “institutionalize” programs
  - Fresh ideas and perspectives are always coming in
  - Status quo is always questioned
  - Only the best ideas are pursued, and only the best performers are funded



# IARPA Snapshot

**IARPA's research portfolio is diverse, including math, physics, chemistry, biology, microelectronics, neuroscience, linguistics, political science, cognitive psychology, and more.**

- **70% of completed research transitions** to U.S. Government partners
- **3,000+ journal articles** published
- IARPA funded researchers have been awarded the **Nobel Prize in Physics** for quantum computing research, a **MacArthur Fellowship**, and a **Bell prize**
- IARPA serves on National Science and Technology Council (NSTC) committees and actively engages with the White House BRAIN Initiative, National Strategic Computing Initiative, and the NSTC Select Committee on Artificial Intelligence, the NSTC Subcommittee on Quantum Information Science (SCQIS), and NSTC Subcommittee on Economic and Security Implications of Quantum Science (ESIX)



# How to Engage with IARPA

## ENGAGE WITH US

Throughout our website you can learn more about engaging with us on our highly innovative work that is having a positive impact in the Intelligence Community and society in general. Click on any of the below links to learn more.

[iarpa.gov](http://iarpa.gov) | 301-243-1995

[dni-iarpa-info@iarpa.gov](mailto:dni-iarpa-info@iarpa.gov)

- Reach out to our Program Managers.
- Schedule a visit if you are in the DC area or invite us to visit you



### Open BAAs

Broad Agency Announcements (BAAs) solicit research proposals for specific programs. Learn more about current BAA opportunities and ways to get involved...



### Requests For Information

Requests for Information (RFIs) are designed to gather more information on an idea in an area in which our program managers are not fully informed...



### Seedlings

Seedlings are typically 9 - 12 month research efforts that are less than \$1M in cost. They are intended to address highly innovative ideas and concepts within...

# SOLSTICE Introduction



Intelligence Advanced Research Projects Activity

I A R P A

Creating Advantage through Research and Technology



# Technical Slides Disclaimer



- All images, references, and articles are included as illustrative examples only
- ODNI and IARPA do not endorse any product or company referenced within
- Changes may occur before the final BAA is released



# Introduction to the SOLSTICE Team



- Dr. Brian Borak, IARPA Program Manager
- Dr. Justin Annibali, Science and Engineering Support
- Salita Biddix, Programmatic Support
- Anticipated Test and Evaluation Partners
  - Track 1 (Space): Johns Hopkins Applied Physics Laboratory, Air Force Research Laboratory
  - Track 2 (Terrestrial surface): National Renewable Energy Laboratory
- Department of Interior (DOI) Contracting Partners



# Energy Harvesting is Key to Many Intelligence Community (IC) Missions



## Planned Research Tracks

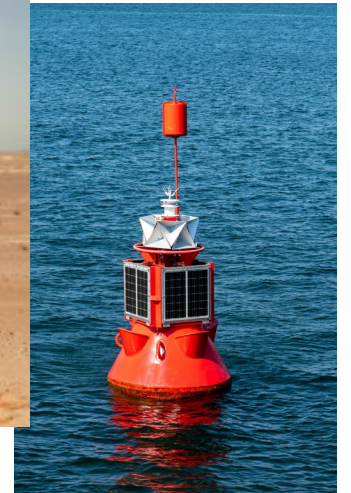
### TRACK 1

#### Space Applications



### TRACK 2

#### Terrestrial Surface Applications



#### *Shared program-level objectives*

High time-weighted system efficiency

High collection area power density

Long Lifetime

Resilient against stressors

Straightforward to deploy remotely

No direct servicing





# Outline



- Motivation
- Program Scope
- Programmatic Structure
- Metrics and Test & Evaluation
- Schedule



# Solar arrays present risks in the space environment



- Typically the largest surface area of a spacecraft
- Must survive large temperature cycles, radiation, the vacuum of space, and debris/micrometeoroid impact
- Expanding the size of the array to meet greater power requirements complicates deployment and makes spacecraft control more difficult
- Damage or destruction can end a mission

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GPS Block IIIA Satellite

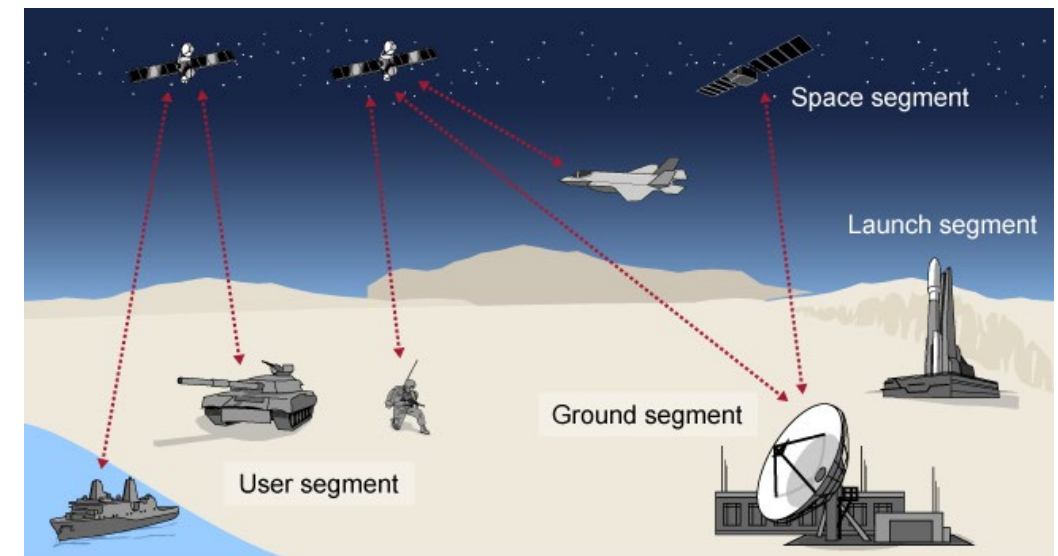




# Power availability limits many capabilities in space



- Active radio frequency payloads (e.g. synthetic aperture radar) often need to duty cycle<sup>1</sup>
- Limited onboard processing of large data files from optical or RF imagery may necessitate downlink to a ground segment before pushing key data to remote users
  - AI/ML functions are usually power-intensive
- Emerging optical communications and increasing bandwidth needs



Source: GAO analysis of Department of Defense (DOD) documentation. | GAO-20-80

(1) "State of the Space Industrial Base 2022": <https://www.diu.mil/latest/state-of-the-space-industrial-base-2022>



# Solar arrays present risks in terrestrial environments



- Easy to identify and target
- Must withstand/perform despite temperature cycles, moisture changes, extreme weather events, soiling/shading
- Poor temperature control, orientation, soiling, and shading reduce performance
- Larger power needs complicates transportation and deployment

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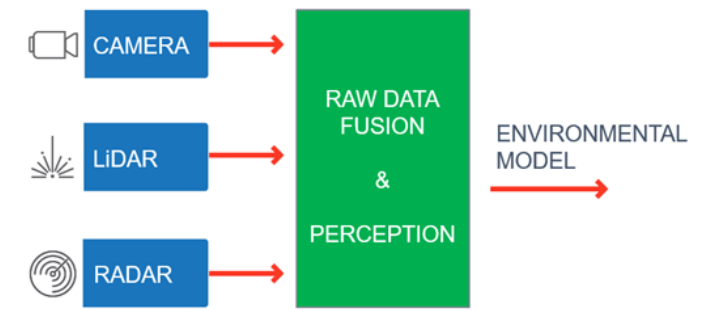


# Power availability limits many remote terrestrial capabilities



- Onboard computation (e.g. AI/ML) for remote surveillance, reconnaissance
  - Optical, audio, environmental sensor fusion and data analysis
  
- Communications bandwidth, distance, frequency of up/download
  
- Longer-duration Uninterruptable Power Supplies (UPSs) for critical systems

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# Reducing the solar array size reduces risk...



*In other words...*

High power density ( $W/m^3$ )



Low volume, less threat

High specific power ( $W/kg$ )



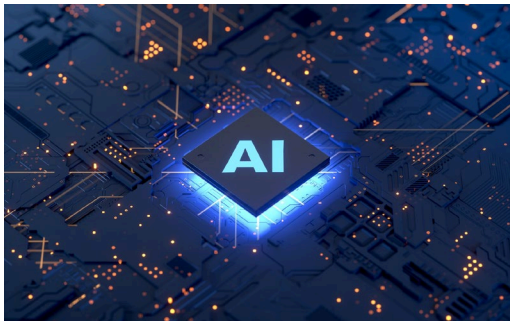
Low weight

High mission lifetime energy yield (Wh)

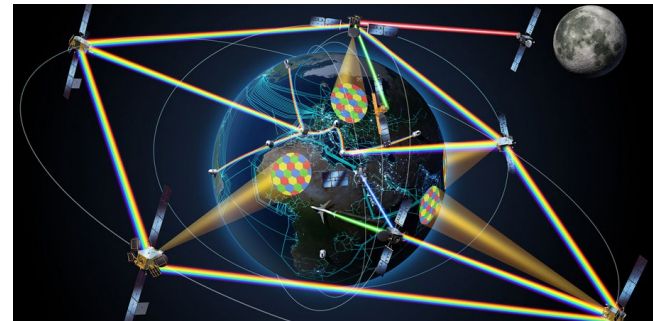


Low loss

...and maximizing power/energy density while minimizing size and weight can enable a range of capabilities



Credit: SPIE

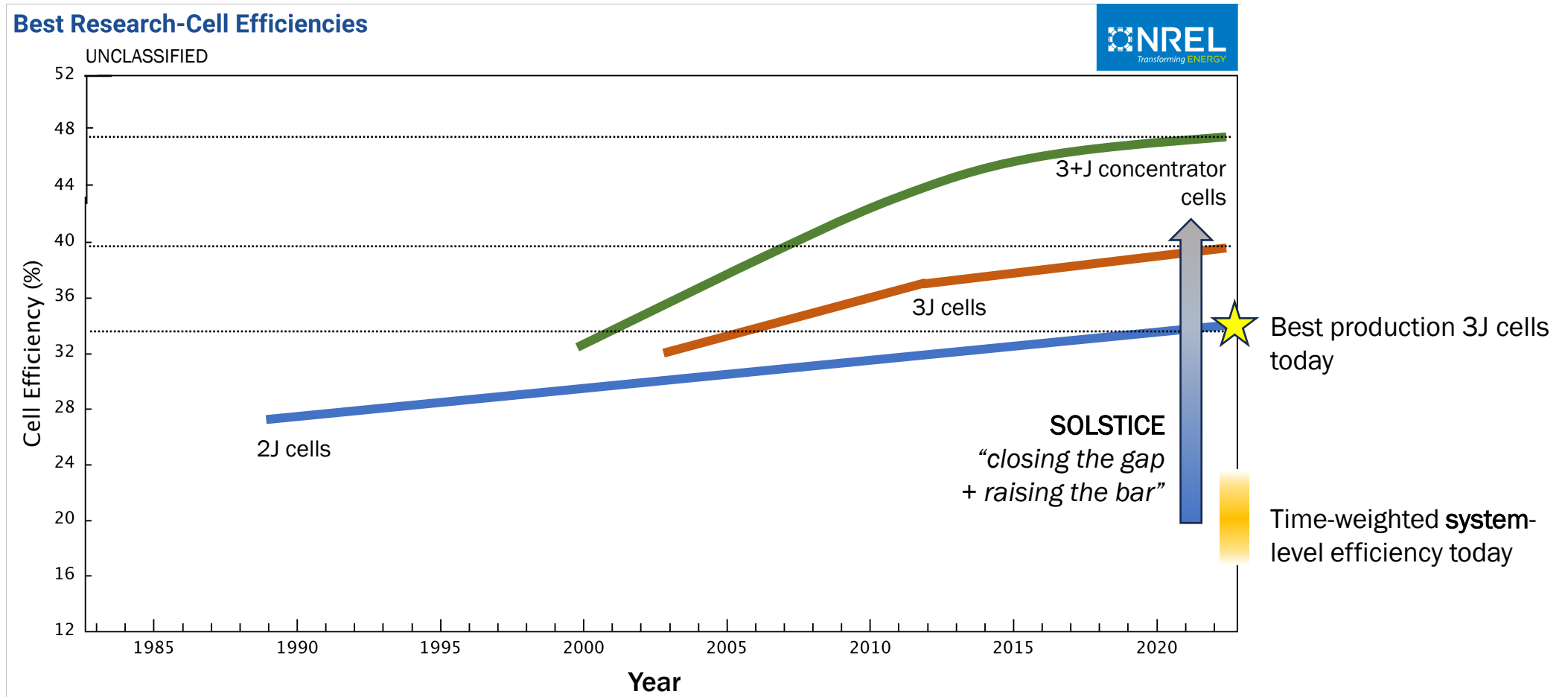


Credit: European Space Agency (ESA)





# Multijunction solar cell improvements have been incremental in recent years




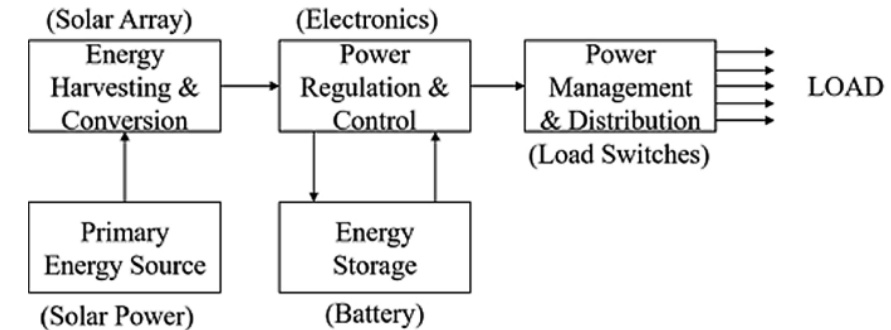
Portions adapted from: <https://www.nrel.gov/pv/cell-efficiency.html>



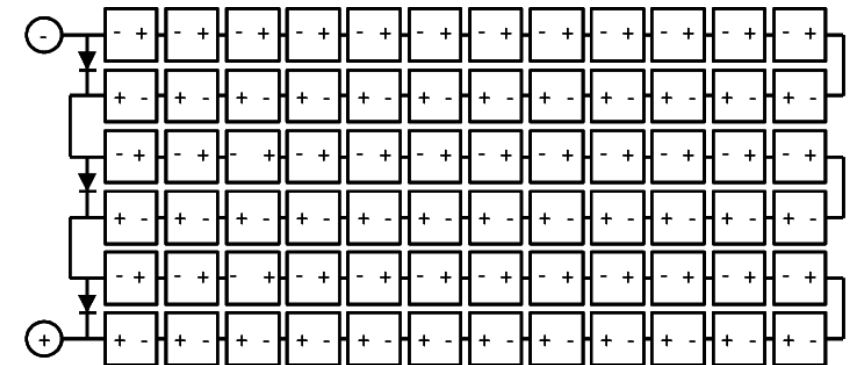
# Cell to system level power density drops significantly in practice



- ~33% STC cell  $\eta_{\text{eff}}$   ~ 20% time-weighted system  $\eta_{\text{eff}}$
- System-level operational loss sources:
  - Cosine losses from non-direct irradiation
  - Partial shading, soiling
  - Thermal coefficients
  - String-level losses (mismatches, cell-level variation and damage)
  - Charge-controller/battery charging inefficiencies
- Limited or no resilience to single-effect degradation
  - Electrostatic discharge
  - Debris/physical impact
  - Directed energy



Simplified electrical power subsystem



Solar module circuit diagram





# Today's Solar Systems versus SOLSTICE Goals



Requirement	III-V MJ	cSi-based	Thin film	SOLSTICE
High system-level efficiency	Yellow	Red	Red	Green
High aperture area power density ( $W_{mp}/m^2$ )	Diagonal lines	Yellow	Red	Green
High volumetric power density ( $W_{mp}/m^3$ )	Yellow	Red	Yellow	Green
High specific power ( $W_{mp}/kg$ )	Diagonal lines	Red	Yellow	Diagonal lines
Resilience against environmental stressors	Diagonal lines	Diagonal lines	Yellow	Green
Resilience against damage events	Diagonal lines	Red	Red	Diagonal lines
Ease of deployment	Yellow	Yellow	Yellow	Yellow

Technology options address requirement poorly

Technology options address requirement moderately

Technology options address requirement well



# SOLSTICE Objectives



- SOLSTICE systems must have:
  - High time-weighted system efficiency, resulting in high mission lifetime energy harvesting yield (kWh)
  - High collection area power density ( $W/m^2$ )
  - Minimal power density reduction over time
  - Capable of autonomous deployment (and no human servicing)
  - Minimize detectability (surface reflection, thermal signature)

**SOLSTICE aims to improve time-weighted system-level efficiency by at least 50% while maintaining or improving upon other performance metrics**



## Why is this so challenging?

- Working at the system level is very complicated
- Materials engineering and manufacturing feasibility limit ultimate fieldable solar cell efficiency
- Constantly changing environments (in space and on earth) result in changing instantaneous efficiency
- Balancing modularity/flexibility with maximizing system efficiency
- “Soft” materials must survive challenging situations
- No ability to service directly



# Outline



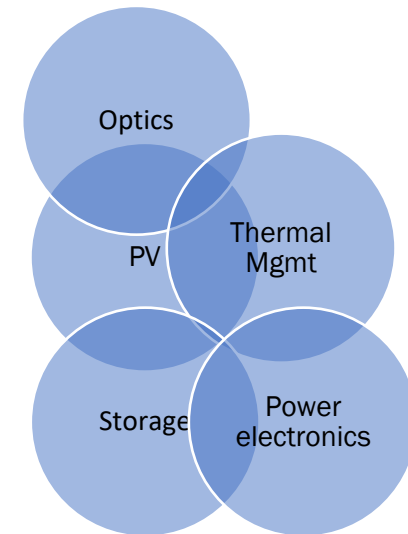
- Motivation
- Program Scope
- Programmatic Structure
- Metrics and Test & Evaluation
- Schedule



# SOLSTICE will take a system-level perspective



- Explore and leverage the intersections of component technologies in:
  - Photovoltaics
  - Optics
  - Power electronics
  - Thermal management/conversion
  - Energy storage
  - Deployment
  - Survivability
  - (and more!)
- Coordination of component technologies at the system level to compensate for changing operating conditions and threats
- Hybridization of technologies to achieve higher power density
- Build-in resilience (and/or repair) capability
- Autonomous deployment and no human servicing expected





# Potential Technology Opportunities



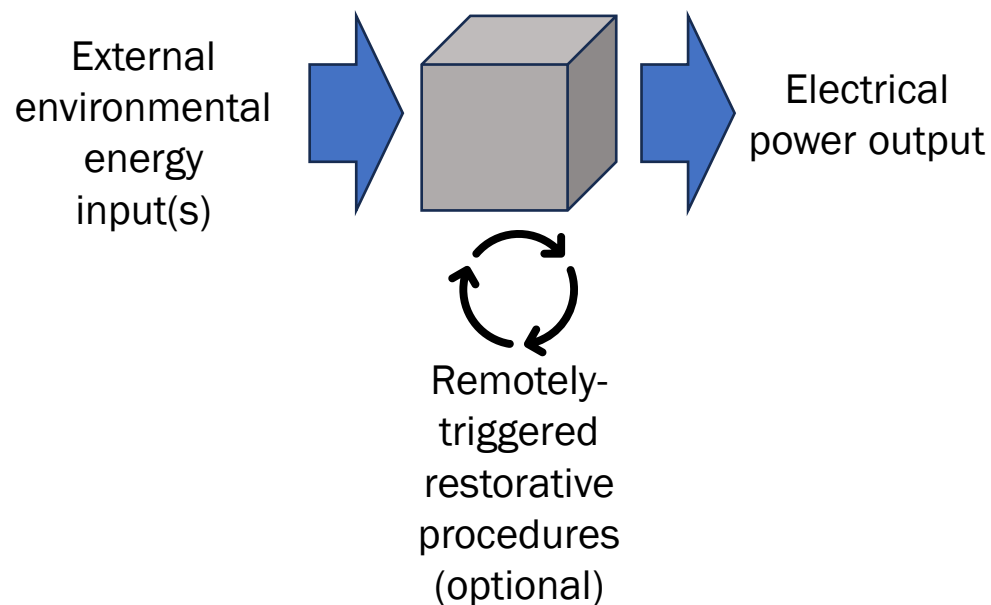
- Examples of types of innovations sought include (for illustrative purposes only):
  - Novel solar cell materials, devices, and structures
  - Optics
    - Micro-concentrator PV
    - Spectrum-splitting
    - Novel optical materials, coatings for:
      - Improved optical efficiency
      - Reduced soiling
      - Resilience against environmental or human-generated threats
  - Thermal management, control, conversion
    - Materials and systems for improved heat transfer, storage, and or rejection
    - Thermal energy conversion (e.g. thermoelectric, thermoradiative devices)
  - “Self-healing” materials, remotely-triggered restorative/repair and/or protective capabilities
  - Highly discretized power electronic topologies for increased resilience and efficiency
  - Non-solar energy conversion available in the environment (provided the system meets the program metrics)



# Concepts In/Out of Scope



## IN-SCOPE



## OUT-OF-SCOPE

- Development of novel electrochemical or thermal energy storage chemistries
- Solutions that use or would integrate radioactive materials
- Component development that does not contribute to an overall system-level efficiency improvement
- Component development only (no system-level approach or analysis)
- Approaches that require physical human interaction for deployment or servicing
- Solutions that cannot be expected to survive in the target environments (i.e. space or terrestrial surface)
- Power beaming



# Relevant Expertise



- Materials science/engineering
- Chemistry/chemical engineering
- Mechanical engineering
- Thermal science/engineering
- Optics/optical engineering
- Radiation physics
- Condensed matter physics
- Theoretical chemistry/physics, modeling
- Systems engineering
- Engineering co-design/development
- Multi-physics modeling/simulation
- Machine-learning (ML)/ artificial intelligence (AI) aided design
- Corrosion
- And many others!





# Outline



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# SOLSTICE Program Tracks

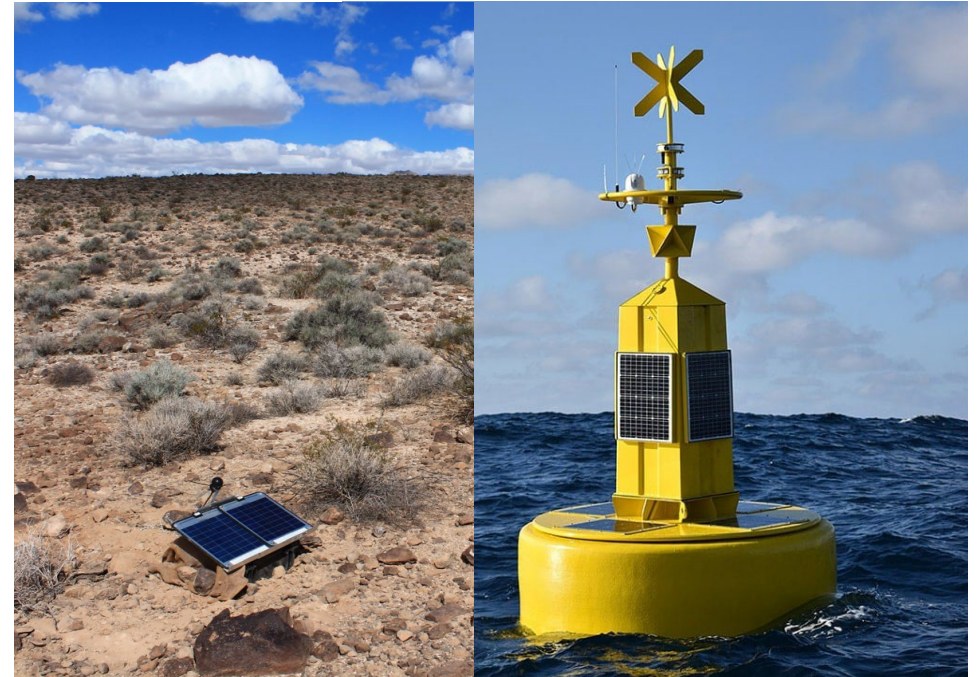


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## TRACK 1: Space Applications



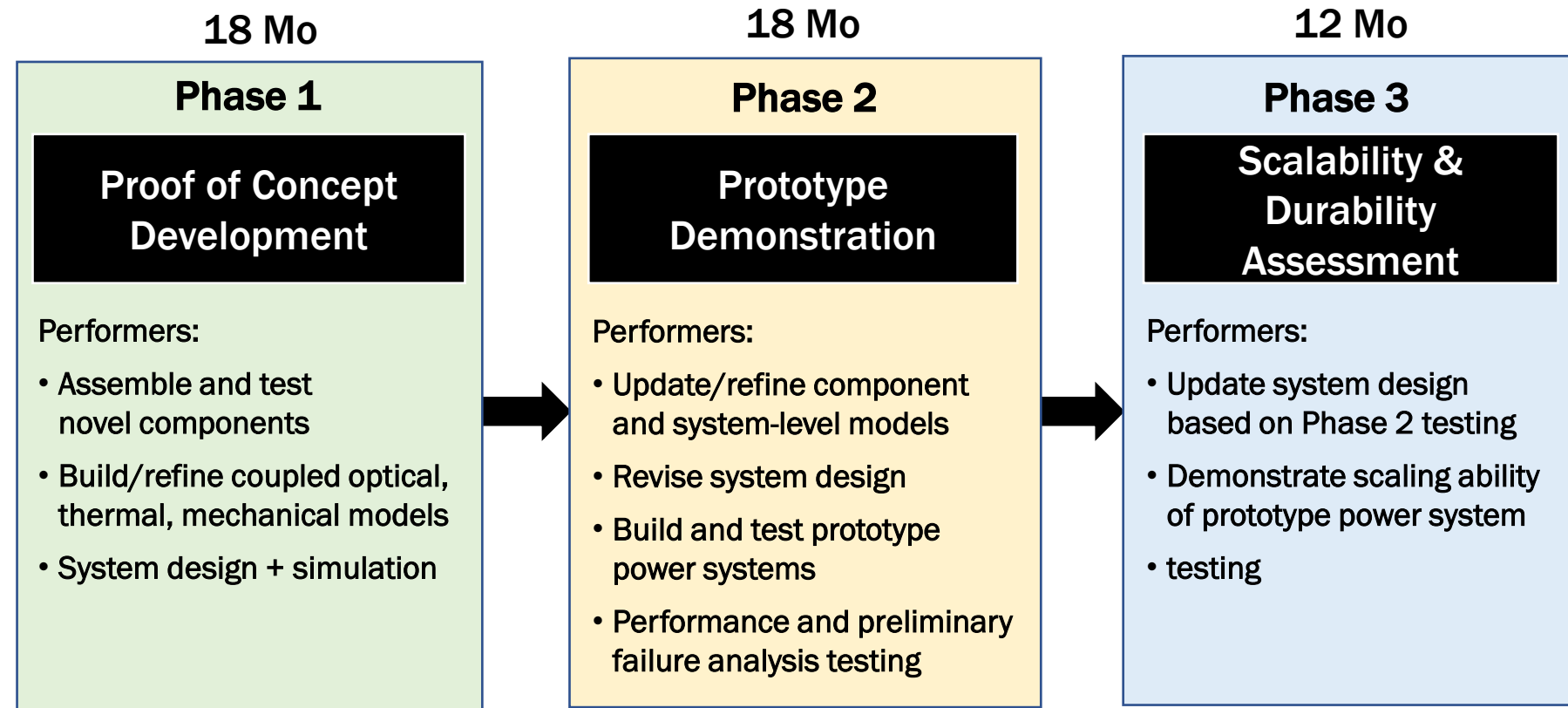
## TRACK 2: Terrestrial Surface Applications



Autonomous deployment to remote regions



# SOLSTICE Program Plan



**Two Tracks: 1) Space Applications 2) Terrestrial Surface Applications**



# Program Deliverable Descriptions



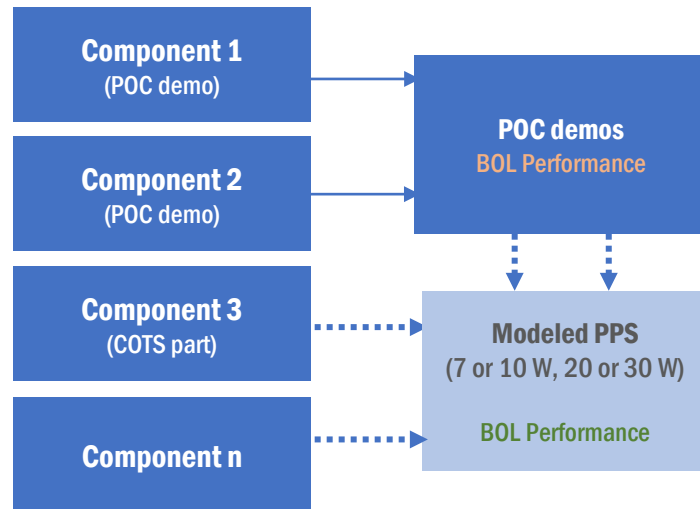
- **Phase 1**
  - POC component-level prototypes
    - Multiple form factors possible – e.g. breadboards, solar cells, optics+cells, key integration of devices, etc.
    - Must be “self contained”, i.e. testable by T&E following a specific set of instructions provided by Performers with minimal setup, adhering to guidelines set by T&E Procedures Manual (provided at program kickoff)
  - POC component-level models
    - Physics-based modeling demonstrating the expected performance under simulated conditions
  - Power system model & design
    - Coupled physics-based modeling estimating the system-level performance using component-level models as an input, over a range of expected conditions specified by T&E Procedures Manual
- **Phases 2 & 3**
  - Prototype Power Systems (PPSs)
    - Combines novel and COTS components to demonstrate the system-level performance proposed
    - Must use a standardized Prototype System Testbed (PST) specification outlined by the T&E team
  - Power system model & design revisions
  - Power system cost model



# Deliverable Types, T&E



## PHASE 1



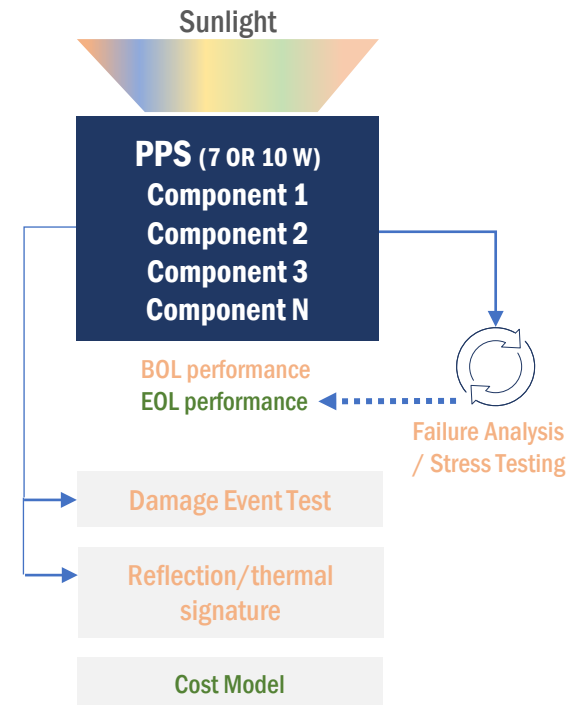
### LEGEND

Experiments

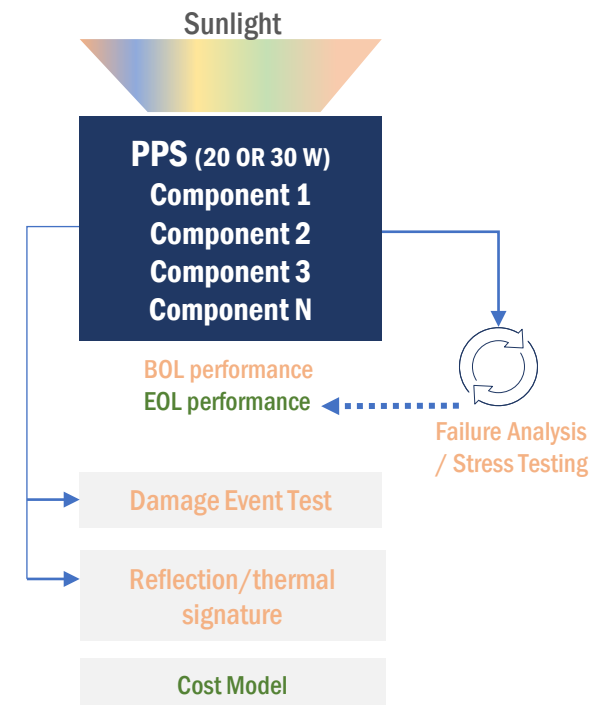
Modeling

PPS = Prototype Power System  
 BOL = Beginning of Life  
 EOL = End of Life

## PHASE 2



## PHASE 3





# Other Program Deliverables



- POC component-level prototypes (Phase 1)
- POC component models (Phase 1)
- Prototype Power Systems (PPSs)
- Power System Model & Design
- Cost model
  
- Technical Management Plan (TMP)
- Technical and Financial Reporting
  - Monthly technical and financial status reports following IARPA templates
- Meetings
  - Monthly Technical Review (can be virtual)
  - Site Visits (at Performer facility, approximately semi-annually)
  - Kickoff and Principal Investigator Meetings (usually Washington DC Metro, approximately annually)



# Outline



- Motivation
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# Program Metrics versus Waypoints



- Metrics are *defined by IARPA*
  - Quantitative measurement of system quality in achieving program goals and objectives
    - Measured during independent T&E
  - Strong factor in IARPA's determination to exercise options for continuing performance
  - Program Milestones set time-based targets for metrics
- Waypoints are *proposed by Offerors*
  - Interim performance measurements by Performers
    - E.g. if a metric is to be collected at month 12, then the Offeror may wish to define waypoints for months 6 and 9
  - Determine progress towards achieving program metrics
  - Normally every 3-6 months but can be more frequent as needed





# TRACK 1 (SPACE): Draft Program Metrics



#	Performance Parameter	Phase 1: <u>Modeled</u> Proof-of-Concept System	Phase 2: Prototype Demonstration	Phase 3: Scalability & Durability Assessment
1	BOL time-weighted system-level energy efficiency (%)	$\geq 30$	$\geq 30$	$\geq 35$
2	BOL and EOL system aperture area power density ( $W_{mp}/m^2$ )	BOL: $\geq 478$	BOL: $\geq 478$ EOL: $\geq 406$	BOL: $\geq 550$ EOL: $\geq 495$
3	BOL system volumetric power density ( $kW_{mp}/m^3$ )	$\geq 20$	$\geq 30$	$\geq 30$
4	Demonstration peak power output ( $W_{mp}$ )	N/A	$\geq 7$	$\geq 30$
5	BOL system specific power ( $W_{mp}/kg$ )	$\geq 80$	$\geq 100$	
6	Loss of $P_{mp}$ following damage event (%)	N/A	$< 20$	



# TRACK 1 (SPACE): Draft Test & Evaluation



- Efficiency, Areal Power Density, Volumetric Power Density, Specific Power determined under these conditions:
  - STP
  - Temperature dependence
  - TVAC
  - Angular dependence
- Surface reflection and IR signature

**TABLE 1: Track 1 (Space) Test & Evaluation Procedures and Schedule**

		POC Samples		Prototype Power Systems		
		Phase 1		Phase 2		Phase 3
	T&E Event #:	1	2	3	4	5
	Performer POP Month Due:	7	14	24	31	43
	Minimum Test Articles Delivered:	1	3	1	3	2
#	TRACK 1 Testing Procedure					
1	Thermal cycling	N/A	10 cycles	N/A	30 cycles	30 cycles
2	UV irradiation	N/A	10 d	N/A	30 d	30 d
3	Vacuum outgassing of volatile materials	N/A	Plan	Test	Test	Test
4	Electron and proton irradiation	N/A	N/A	Plan	Test	Test
5	Simulated damage events	N/A	N/A	Plan	Test	Test
6	Mechanical stress	N/A	N/A	N/A	Plan	Test*

Plan = plan developed by the Performer to mitigate the impacts of the respective testing planned for a later T&E event, due at the time of test article submission for the specified T&E event

\* Performed after all other testing is completed to help inform the next stage of development



## TRACK 2 (SURFACE): Program Metrics



#	Performance Parameter	Phase 1: <u>Modeled</u> Proof-of-Concept System	Phase 2: Prototype Demonstration	Phase 3: Scalability & Durability Assessment
1	BOL time-weighted system-level energy efficiency (%)	≥ 30	≥ 30	≥ 35
2	BOL and EOL system aperture area power density ( $W_{mp}/m^2$ )	BOL: ≥ 370	BOL: ≥ 370 EOL: ≥ 315	BOL: ≥ 390 EOL: ≥ 351
3	BOL system volumetric power density ( $kW_{mp}/m^3$ )	≥ 20	≥ 30	≥ 30
4	Demonstration peak power output ( $W_{mp}$ )	N/A	≥ 5	≥ 20
5	BOL system specific power ( $W_{mp}/kg$ )	≥ 60	≥ 80	



## TRACK 2 (SURFACE): Draft Test & Evaluation



**TABLE 2: Track 2 (Terrestrial) Test & Evaluation Procedures and Schedule**

- Efficiency, Areal Power Density, Volumetric Power Density, Specific Power determined under these conditions:
  - STP
  - Variable irradiance
  - Temperature dependence
  - Angular dependence
- Surface reflection and IR signature

		POC Samples		Prototype Power Systems		
		Phase 1	Phase 2	Phase 3		
	<b>T&amp;E Event #:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
	<b>Performer POP Month Due:</b>	7	14	24	31	43
	<b>Minimum Test Articles Delivered:</b>	1	3	1	3	2
#	TRACK 2 Testing Procedure					
1	Thermal cycling	N/A	10 cycles	N/A	30 cycles	30 cycles
2	AM1.5G UV irradiation	N/A	10 d	N/A	30 d	30 d
3	Damp heat test	N/A	N/A	Plan	10 d	30 d
4	Soiling	N/A	N/A	N/A	Test	Test
5	Simulated damage events	N/A	N/A	Plan	Test	Test
6	Mechanical stress (vibration, shock, bending)	N/A	N/A	N/A	Plan	Test*

Plan = plan developed by the Performer to mitigate the impacts of the respective testing planned for a later T&E event, due at the time of test article submission for the specified T&E event

\* Performed after all other testing is completed to help inform the next stage of development



# Outline

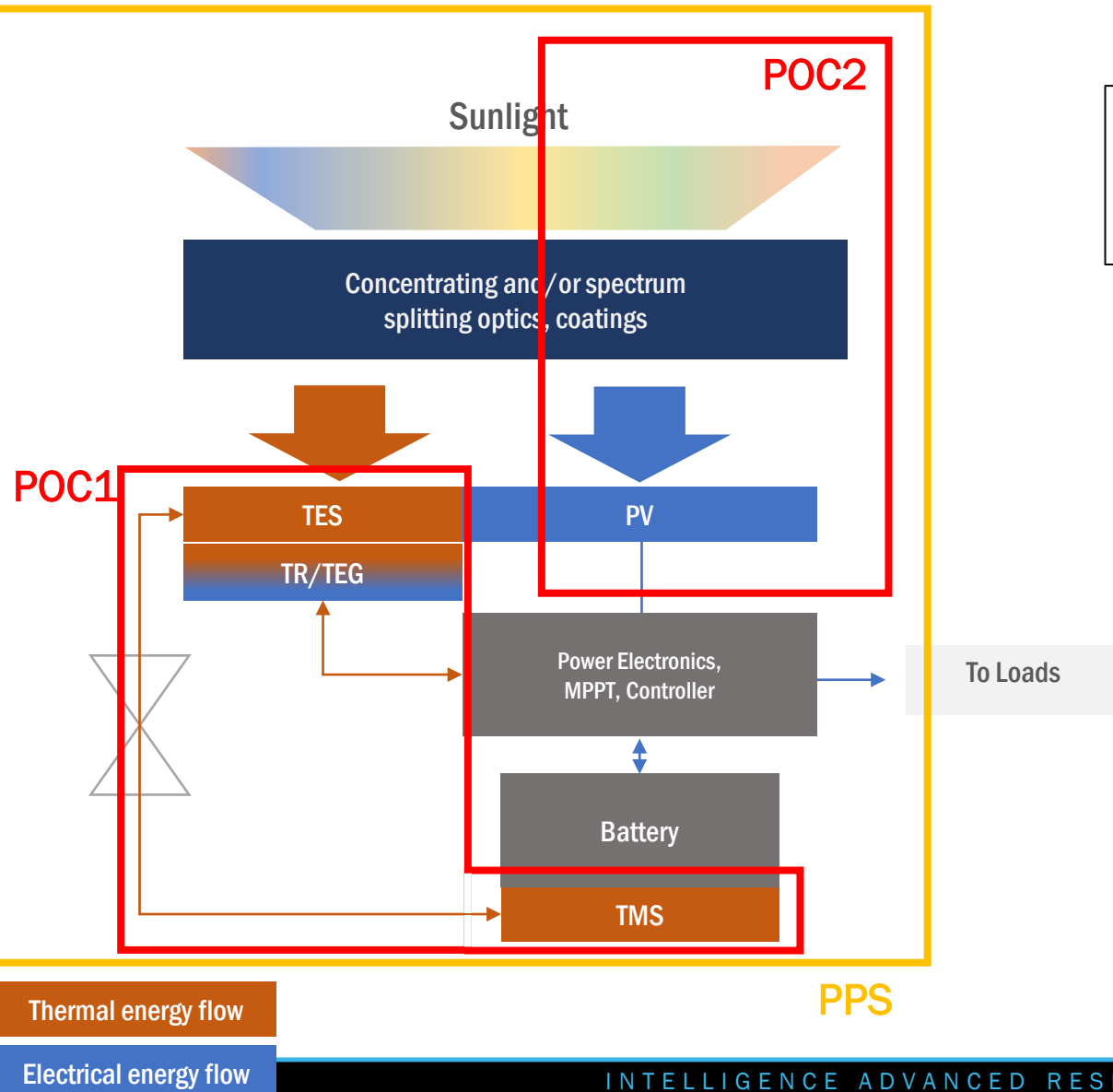


- Motivation
- Scope
- Programmatic Structure
- Metrics and Test & Evaluation
- Schedule





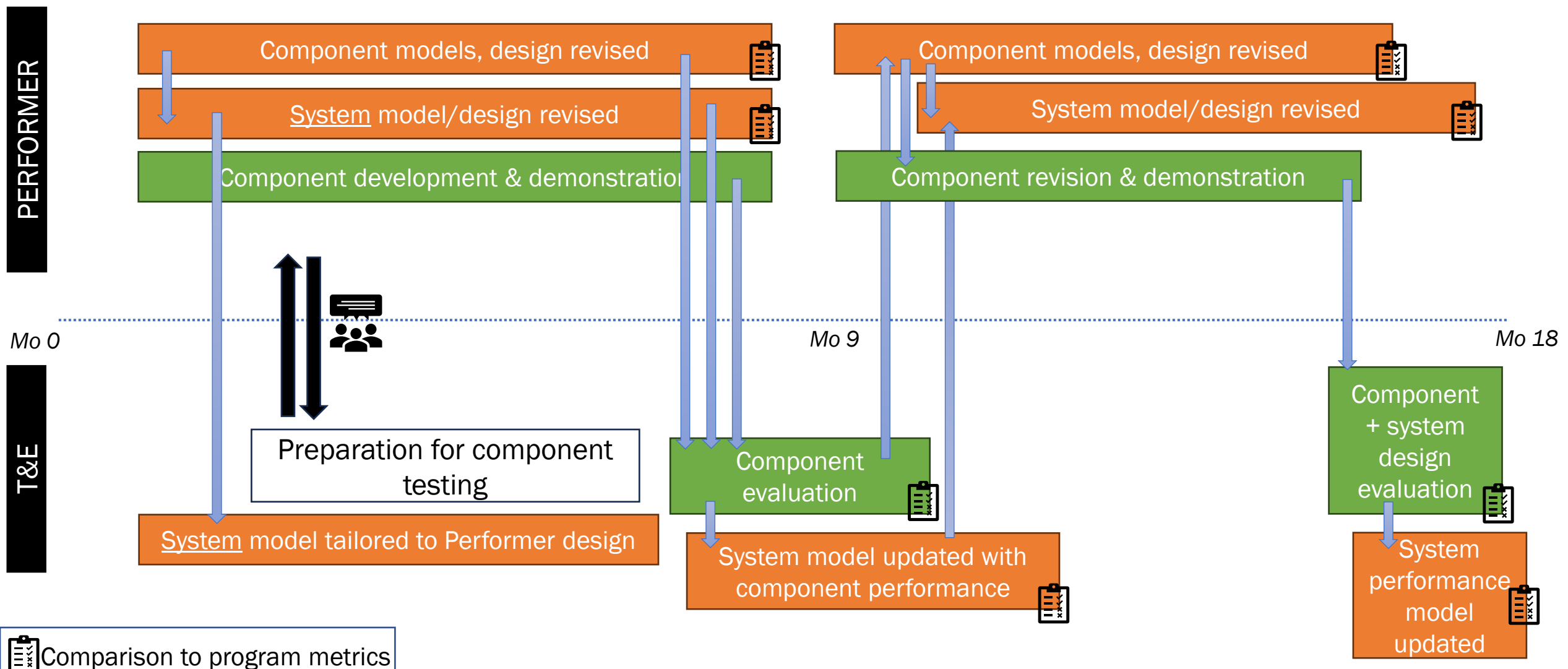
# Example SOLSTICE System



Examples provided exclusively to illustrate the thought process in designing a concept for SOLSTICE and how it would proceed through program execution

- **Phase 1 Deliverables**
  - POC1 demonstration(s) + physics-based modeling
  - POC2 demonstration(s) + physics-based modeling
  - PPS system design and preliminary model
- **Phase 2 Deliverables**
  - Revised PPS design & model
  - PPS demonstration(s) to meet Phase 2 metrics
  - Preliminary cost model
- **Phase 3 Deliverables**
  - Revised PPS design & model
  - PPS demonstration(s) to meet Phase 3 metrics
  - Revised cost model

# Phase 1 Process



Comparison to program metrics

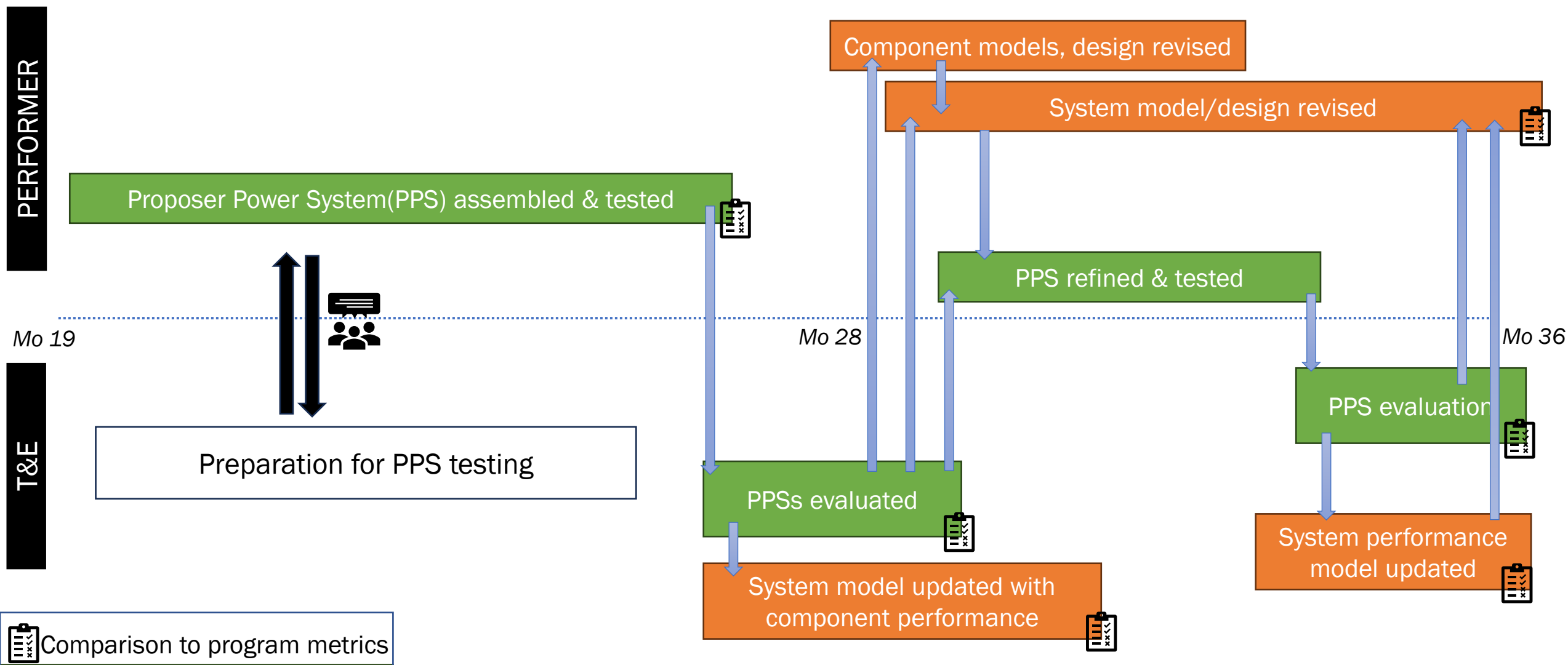
Hardware dev/analysis

Modeling/simulation



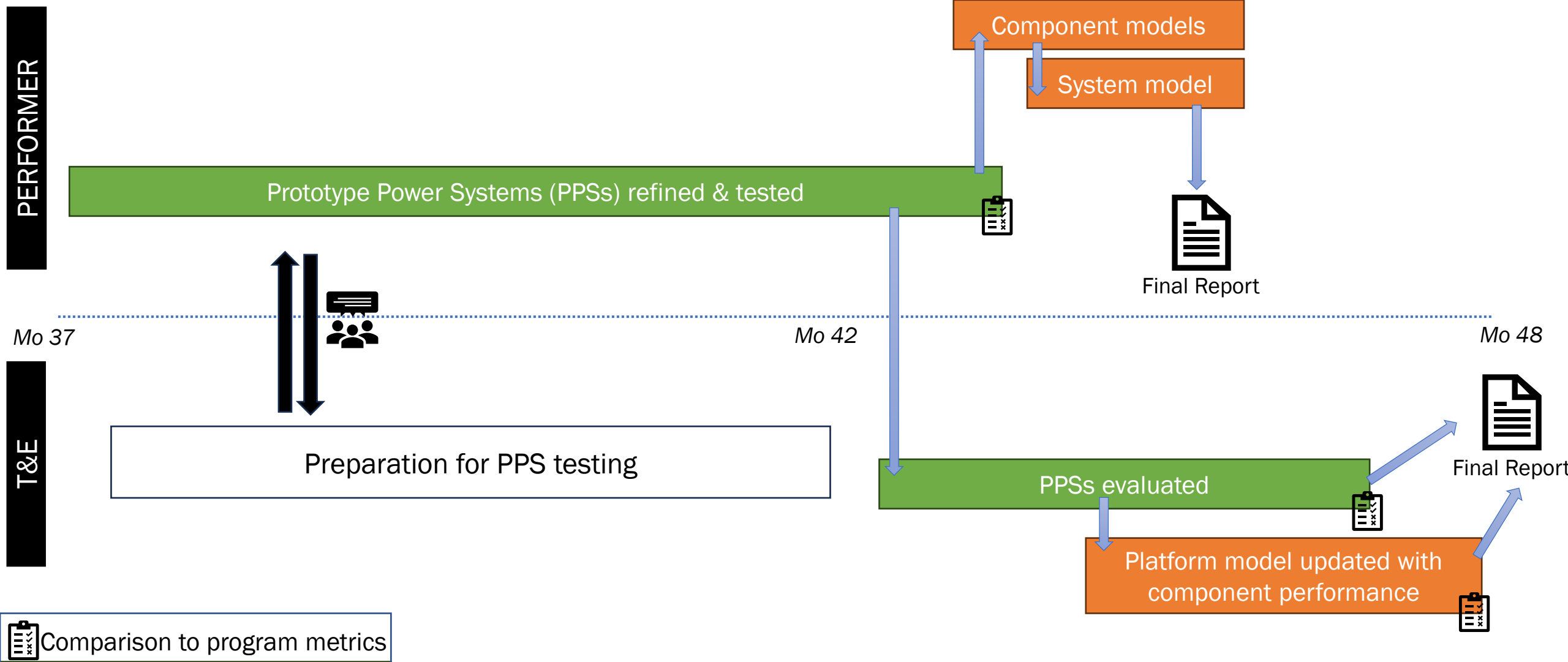


# Phase 2 Process





# Phase 3 Process



Comparison to program metrics

*Hardware dev/analysis*

*Modeling/simulation*



# Please send questions and comments



- Please send your questions to:  
[dni-iarpa-solstice-proposersday@iarpa.gov](mailto:dni-iarpa-solstice-proposersday@iarpa.gov)
- Do **NOT** send questions over chat
- Feedback on the draft BAA is also welcome (but will not receive a response) during or after this event.
  - What is confusing? What are we missing? Anticipated problems?
  - Keep in mind this is designed to be high-risk early-stage R&D



# Agenda



Time	Topic	Speaker
10:00 a.m. – 10:10 a.m. EDT	Welcome, Logistics, Proposers' Day Goals	Brian Borak, Program Manager
10:10 a.m. - 10:20 a.m.	IARPA Overview	Richard Muller, IARPA Director
10:20 a.m. - 11:00 a.m.	SOLSTICE Program Overview	Brian Borak
11:00 a.m. - 11:20 a.m.	Contracting Overview	Frank Kennedy, DOI CO
11:30 p.m. - 1:00 p.m.	<b>Break (Submit questions to email by 11:30 a.m.)</b>	
1:00 p.m. - 2:00 p.m.	Answers to Selected Technical Questions	Brian Borak
2:00 p.m. - 2:05 p.m.	Introduction to Lightning Talks	Brian Borak
2:05 p.m. - 4:00 p.m. (est.)	Lightning Talks*	Potential Performers
4:00 p.m. - 5:00 p.m.	Informal Teaming Discussions*	In-Person Participants

\*The Government will not attend these events



# SOLSTICE Proposer's Day

Contracting Officer for SOLSTICE  
Frank Kennedy, DOI - CO



[DOI.GOV/IBC](https://doi.gov/IBC)

# DOI Introduction

Department of the Interior –  
Interior Business Center (DOI- IBC)

In partnership with

The Intelligence Advanced Research Projects  
Activity (IARPA)

# Precedence

- Information contained within the BAA takes precedence over what is discussed today.
- All vendors should propose only to what is discussed in the BAA and not to these slides or information conveyed today.

# Award Instruments

- Procurement Contracts, using FAR 35 – Research and Development Contracting.
- Multiple awards are anticipated.
- The SOLSTICE program is anticipated to be a 48-month effort. Applications include two (2) separate tracks: Track 1 – Space and Track 2 - Terrestrial Surface Environments. Each Track is comprised of three (3) Phases. Offerors may propose to each Track with fully independent proposals. All proposals must include a solution for Phases 1,2 and 3. Proposals that do not include a solution for all 3 phases will be considered non-responsive and will not be evaluated.
- The Government reserves the right to select for award all, some, one, or none of the proposals received in response to the BAA.



# General Information

- Carefully read all information in the BAA.
- Certain sections will contain formatting instructions and page limitations. Any information beyond the page limitations will not be considered.
- Be sure to include all required documents and attachments.
- Classified proposals are not anticipated for this program
- Proposal Due Date and Time - Be sure to submit early enough to avoid transmittal issues. Proposals after the due date will not be considered. It is strongly recommended to submit 48 hours before the deadline.

# Eligibility Information

- The following are generally **not** eligible to submit proposals under this BAA or participate as team members under proposals submitted by eligible entities:
  - Other Government Agencies,
  - Federally Funded Research and Development Centers (FFRDCs),
  - University Affiliated Research Centers (UARCs),
  - Any organizations that have a special relationship with the Government; e.g., that would give them
    - access to privileged and/or proprietary information,
    - access to Government equipment or real property.

# Eligibility (cont)

- Foreign entities and/or individuals may participate but only as a part of a U.S. based team. The prime contractor must be a U.S. entity. Foreign entities and individuals may participate as subcontractors or employees of a U.S. based entity; however, all foreign participation must comply with any necessary Non-Disclosure Agreements, Security Regulations, Export Control Laws, and other governing statutes applicable under the circumstances.

# BAA Release Information

- BAA will be posted to SAM.gov via Department of the Interior, Interior Business Center (DOI-IBC)
- The BAA will be released for 45 days.
- All information required for submitting a proposal will be outlined in the BAA.

# Proposal Submission Process

- Proposals must be submitted through IARPA's IDEAS system
  - Interested Offerors must register electronically IAW instructions on: <https://iarpa-ideas.gov> (will be available after BAA is posted)
  - Interested Offerors are strongly encouraged to register in IDEAS at least one week prior to proposal "Due Date"
  - Offerors must ensure the version submitted to IDEAS is the "Final Version"
- The BAA will have instructions for how to respond if there are system problems with IDEAS

# Evaluation Process

- The BAA will detail the method for proposal evaluation and selection for contract award; IARPA generally follows a three-step process:
  - Step 1: Technical proposal evaluation and selection for negotiations. This is conducted through a scientific/peer review process after which Offerors are notified of selection.
  - Step 2: Selected Offerors are required to submit Cost/Price proposal.
  - Step 3: Negotiation and contract award conducted by the Contracting Officer.
- Proposals will be reviewed individually against the BAA requirements in accordance with FAR 35, Research and Development Contracting, and not against each other.

# Evaluation Process (cont)

- Preliminary review for proposal completeness, eligibility requirements, conformance with BAA requirements.
- All information necessary for the review and evaluation of a proposal must be contained in the proposal itself. No other material will be provided to the panel. Proposals should contain sufficient technical detail to allow for in depth technical assessment.

# Organizational Conflicts of Interest

- IARPA follows FAR Part 9 regarding Organizational Conflicts of Interest (OCIs). The main principles being:
  - Preventing conflicting roles that might bias a contractor's judgement.
  - Preventing an unfair competitive advantage.
- The BAA will describe how offerors are to identify and disclose all facts relevant to potential OCIs for the offeror as well as any proposed team members.
- OCI disclosures may require a mitigation plan describing the actions the offeror will take or intends to take to prevent the conflict.
- IARPA generally prohibits contractors from concurrently providing System Engineering Technical Assistance (SETA) and Test and Evaluation (T&E) support while being a technical R&D performer due to OCI concerns. Each case will be determined individually.



# Pre-Publication Review

- IARPA encourages publication of **UNCLASSIFIED** IARPA-funded research in peer-reviewed journals, presentation at conferences and publication in conference proceedings.
- Prior to public release of any work submitted for publication, the Performer will:
  - Communicate results to be publicly released with the IARPA Program Manager to discuss any sensitivities (e.g., security, speculation on IC use cases, etc.)
  - Provide advance courtesy copies to the IARPA PM and Contracting Officer Representative (COR).
  - Pre-publication approval of certain information may be required if it is determined that its release may result in the disclosure of sensitive intelligence information. A courtesy soft copy must be submitted at least 5 business days prior to release in any form.

# Academic Institutional Acknowledgement

- According to Executive Order 12333, contracts or arrangements with academic institutions may be undertaken only with the consent of appropriate officials of the institution.
- An Academic Institution Acknowledgement letter is required for offerors that are academic institutions.
- A template for this letter will be included in the BAA. Each letter must be signed by a senior official of the institution ( e.g. President, Chancellor, Provost or other appropriately designated individual).
- IARPA requires this letter before entering into negotiations and/or awarding a contract. It is highly advised that it be submitted with the proposal.

# Intellectual Property

- The Government needs to be able to effectively manage the program and evaluate the output and deliverables, communicate the information across Government organizations and support further use and development of program results.
- Offerors will address their IP Rights assertions in their proposal. The Government may request additional information as may be necessary to evaluate.
- The Government will evaluate the IP rights being offered and determine if the rights are in the Government's best interest.

# Proposal Evaluation Criteria

- Current Technical Evaluation Factors
  - A. Overall Scientific and Technical Merit
  - B. Effectiveness of Proposed Work Plan
  - C. Contribution and Relevance to the IARPA Mission and Program Goals
  - D. Relevant Experience and Expertise
  - E. Resource Realism
- The above Technical Evaluation Factors are **anticipated** however, proposers should review the BAA for the criteria as these Factors are subject to change.
- Cost/Price Proposal – The BAA will provide specific instructions and a Cost/Price Proposal Template will be provided as a BAA attachment. The Prime and all subcontractors must submit a completed Cost/Price Proposal using the template provided.

# Communications

- All questions or discussions regarding this solicitation must be directed to the Contracting Officer (CO).
- CO: Frank Kennedy (Frank\_Kennedy@ibc.doi.gov)
- All communication throughout this process must be handled formally and through the proper channels, which means all parties must ensure a DOI Contract Specialist or Contracting Officer is present and/or engaged during and all communication exchanges.
- Any informal communications or outside communication may delay and/or jeopardize a potential award.

# Potential Important Dates

- Proposals will be due approximately 45 days from BAA issuance. Proposals submitted after the closing date will not be considered or evaluated by the Government.
- It is recommended Offerors submit the proposal package at least 24-48 hours prior to the closing date/time to ensure timely receipt.
- Full BAA Posting: ~ Late May/Early June 2024 (estimate)
- Question Period: two (2) week time period from BAA posting
- Proposals due forty-five (45) days from BAA posting VIA IDEAS
- Amendments to the BAA may occur after initial release, therefore it is the responsibility of each Offeror to access SAM.gov for most current information. Proposals will be expected incorporate/ comply with all amendments.

# Questions & Answers (time permitting)

- Q&As at today's Proposers' Day reflect informal information and do not override the BAA. The BAA is the authoritative document.
- Please read entire BAA before submitting questions.
- Pay attention to Proposal & Submission Information.



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\*The Government will not attend these events





# Answers to Selected Questions

Dr. Brian Borak | Program Manager | May 7, 2024



Intelligence Advanced Research Projects Activity

# I A R P A

Creating Advantage through Research and Technology



# In-Person Lightning Talks Agenda



Time	Speaker	Institution
2:05 PM	Rajib Datta	GE Vernova Advanced Research
2:10 PM	Noren Pan	MicroLink Devices
2:15 PM	David Grant	Apogee Semiconductor, Inc.
2:20 PM	Wanye Nie	SUNY Buffalo
2:25 PM	Vincent Hearn	Solestial, Inc.
2:30 PM	Luz Martinez-Miranda	U. of Maryland
2:35 PM	Seth Hubbard	Rochester Institute of Technology
2:40 PM	Patrick Maeda	SRI International

No Q&A during this session. Participants should contact presenters directly afterwards



# Webex Lightning Talks Agenda



Time	Speaker	Institution
2:50 PM	Bin Chen	Northwestern U.
2:55 PM	Robert Pilawa-Podgurski	U. of California, Berkeley
3:00 PM	Matt Renola	Vicor Corporation
3:05 PM	Nicholas Rolston	Arizona State U.
3:10 PM	Aswath Pattabi Raman	UCLA
3:15 PM	Colin Bailie	Tandem PV, Inc.
3:20 PM	Todd Otanicar	Boise State U.
3:25 PM	Volodimir Grebenyuk	Ascent Systems Technologies
3:30 PM	Pablo Bueno	SWRI
3:35 PM	Omid Beik	Colorado School of Mines
3:40 PM	Linxiao Zhu	Penn State U.
3:45 PM	Xiaoming Wen	RMIT U.

**No Q&A during this session. Participants should contact presenters directly afterwards**