Air Force Scientific Advisory Board

I n t e g r i t y - S e r v i c e - E x c e l l e n c e

Future Air Force Vanguard Selection and Management Processes

SAB "Quick-Look" Study Outbrief

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Disclaimer

The Air Force Scientific Advisory Board (SAB) is a Federal Advisory Committee. All statements, findings, recommendations, and conclusions herein represent the views of the SAB and do not represent the official position of the Department of the Air Force or the Department of Defense.

Study Tasking

- **Assess options for selecting and managing future Vanguards and recommend options that are most likely to meet objectives of the Vanguard initiative**

    - **Survey key Air Force stakeholders to determine Vanguard goals, constraints and mission drivers**

    - **Survey government and commercial entities to understand their processes for selecting and managing complex prototyping programs**

    - **Identify distinguishing elements of successful processes for such complex prototyping programs and recommend best practices**

    - **Using current Vanguards as case studies, compare best practices with current and planned selection criteria**

    - **Recommend metrics, analyses, and processes to inform selection and management of future Vanguard programs**

Identify selection and management processes that will maximize the potential for rapidly developing and transitioning "game changing capabilities" via Vanguards

"Bottom Line Up Front"

- **Concept ideation, exploration, and downselection phase of the selection process is the single most important key to success of this initiative**
  - **Requires clear articulation of disruptive needs and opportunities, and technology collection drawing from wider range of sources**
- **Successful Vanguard candidates should be assessed by an independent Validation Panel before being recommended to CDC for selection**
- **Achieving disruptive innovation, rapid pace, agility, and delivery of end-state capabilities requires Vanguards to be "operated like a start-up"**
- **When appropriate based on agreed-upon exit criteria, "de-Vanguarding" is essential to avoid endless pursuits and free up funds for other concepts**
- **Potential follow-on actions upon completion of a successful Vanguard include numerous options, not only a follow-on Program-of-Record**
- **If a future warfighting capability is "potentially transformational enough" to be a Vanguard, then it warrants DAF-level commitment and attention**

Vanguards seek to provide transformational future force warfighting capabilities

CDC: Capability Development Council

Study Participants

Study Leadership

- **Dr. Melissa Choi, Study Chair**
- **Mr. Greg Simer, Study Vice Chair**

Additional SAB Members

- **Dr. Werner Dahm, EXCOM**
- **Dr. Michael Bear**
- **Dr. Rodney Bowersox**
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AFRL Representatives

- **Mr. Chris Ristich (SDPE and TCO)**
- **Mr. Tim Sakulich (AFRL/RX)**
- **Lt Col Ethan Holt (AFRL/RXA)**

Executive Officers / Support Staff

- **Lt Col (sel) Ken Corigliano (Co-lead)**
- **Maj Jed Sherman (Co-lead)**
- **Maj Kenitra Fewell**
- **Maj Daniel Sabatelli**
- **Capt James Corcoran**
- **Capt Eamon Cullen**
- **Capt Casey Hawkins**
- **Capt Jonathan Poole**
- **Capt Alexa Thomsen**

Briefings and Site Visits

DAF / MAJCOMs

- AFWIC
- SAF/AQR
- AFMC/CC
- AFLCMC
- AFRCO
- AF/ST
- AF Chief Scientists Council

AFRL

- AFRL/CC
- AFRL/CA
- AFRL/RS (SDPE)
- AFRL/RST (TCO)
- AFRL/XP

AFRL (cont'd)

- Center for Rapid Innovation
- AFRL/RD
- AFRL/RH
- AFRL/RI
- AFRL/RV
- AFRL/RW
- AFRL/RX
- AFRL/RY

Other DoD / IC

- DARPA
- SCO
- NRO
- NIC

Venture Capital (VC) Firms

- Accel
- Incubic
- Khosla Ventures
- Vulcan Capital
- Kleiner Perkins
- Battery Ventures

FFRDC/UARC/Nonprofit

- Battelle
- JHU APL
- MIT Lincoln Laboratory
- RAND

Commercial Industry

- Aurora Flight Sciences

Air Force 2030 S&T Strategy

Vision: An Air Force that dominates time, space, and complexity across <u>all</u> operating domains to project power and defend the homeland

- **The 2030 Strategy has three objectives:**

  1) *Develop and deliver transformational strategic capabilities*

  2) Reform the way science and technology is led and managed

  3) Deepen and expand the scientific and technical enterprise

- ***AF will allocate at least 20% of S&T to Objective 1 to drive future force design, including new "Vanguard programs"***

- **Vanguard programs are a key component of Objective 1, but they support (and are supported by) Objectives 2 and 3**

Definitions of a "Vanguard"

- **2030 Strategy Definition (April 2019)**
  - **Vanguard programs will advance emerging weapon systems and warfighting concepts through <u>prototyping and experimentation</u> … and <u>demonstrate the viability of leap-ahead capabilities</u> to warfighters**

- **CDC-approved Definition (August 2019)**
  - **<u>Capability development efforts with enterprise commitment to deliver game-changing capabilities</u> that transform operations for future force**
    - **Vanguards intended to build and demonstrate systems to test viability of transformational concepts**
    - **Not just tech demos; Vanguards are to be "Air Force efforts"**
    - **Align with "Air Force Operating Concept" and "Theory of Victory"**
    - **Involves AFRL commitment to fund 6.3, and DAF commitment to fund 6.4**
    - ***DAF commitment to transition is a distinguishing characteristic***

Vanguard definition has changed to focus on ensuring "transitionability", but this may be incompatible with the inherently high-risk nature of developing "leap-ahead capabilities"

Vanguards Are a Way to Bridge the "Valley of Death"

- **AFRL technologies have historically had difficulty being transitioned to MAJCOM users; user takes on all follow-on funding and associated risk**

- **DAF/AFWIC-prioritized Vanguards are a new "bridge" for developing and fielding transformative warfighting capabilities from AFRL technologies**

Vanguards bridge the traditional "Valley of Death"
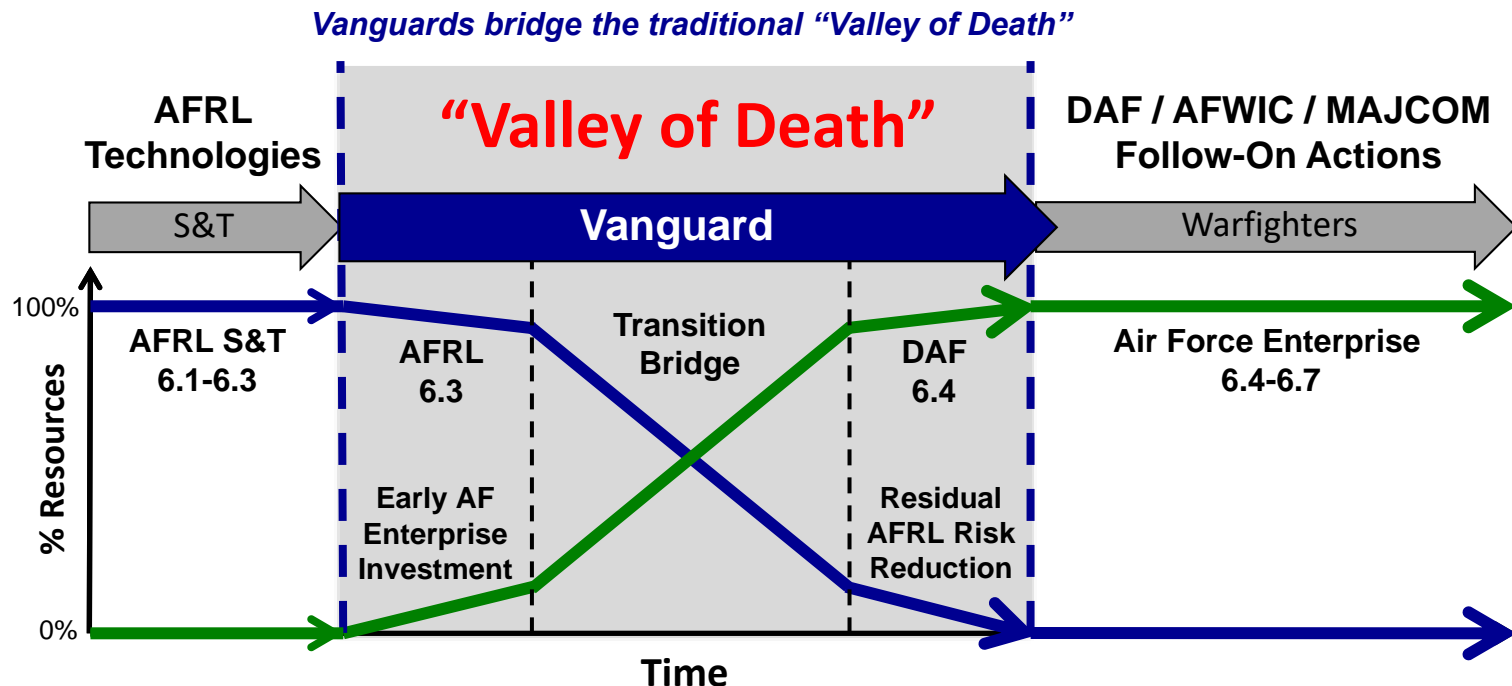
Vanguards Are Only a Small Fraction of Air Force S&T Budget

- **Air Force 2030 S&T Strategy directs at least 20% of annual core S&T budget to *transformational capabilities***

  - **These will represent $540M of $2.5B planned core S&T budget by FY24**
  - **But … *Vanguards* are only a small part of *this* budget segment**
  - **Vanguards will account for only 4% of the total AF <u>core</u> S&T budget**

Air Force Core S&T Budget (FY24)

6.1 Budget $500M	6.2 Budget* $700M	6.3 Budget* $800M	
	* Does not include $500M for personnel	*Enduring Technology $400M*	*Transformational Technology $400M*
	AF Explore & SDCP $140M		**Vanguards $100M**

SDCP: Seedlings for Disruptive Capability Program

Vanguards seek to have major game-changing impacts on 2030 warfighting capabilities ... but they represent only a small fraction of the core Air Force S&T budget

Vanguard Concept is Evolving

Nov 2019	Current	Objective
Vanguard "v0" *... "Quick Start"*	**Vanguard "v1"** *... "Pilot Process"*	**Vanguard "v2+"** *... "Enduring Process"*

Nov 2019 — Vanguard "v0" ... "Quick Start"

- **Identified initial Vanguard candidates**
- **Announced first set of Vanguards (v0)**
- **TEO stood up TCO**

TCO: Transformational Capability Office

Current — Vanguard "v1" ... "Pilot Process"

- **Established Vanguard v0 program offices**
- **Executed AF Explore 1.0**
- **Initiated 6.2 SDCP call**
- **Executing WARTECH 1.0 to select next Vanguards**

SDCP: Seedlings for Disruptive Capability

Objective — Vanguard "v2+" ... "Enduring Process"

- **Develop/implement a process for Vanguard concept ideation, exploration, and downselection**
- **Develop an effective, robust, repeatable selection process**
- **ID best-practice management and execution models**
- **Define criteria for success and for "de-Vanguarding"**

Focus of this study is on identifying an enduring Vanguard v2+ process, but these insights can also productively influence the current Vanguard v1 pilot process

Vanguard v0: "Quick Start"

- **Vanguard "v0" selections were a "Quick Start" implementation of the Vanguard concept**
  - **Not designed as a sustaining process**

- **First Vanguards declared in Nov 2019**
  - **Skyborg**
  - **Golden Horde**
  - **Navigation Technology Satellite 3**

- **Each is in a different state of technical maturity and "Vanguard readiness", but common characteristics are emerging**
  - **Integrating multiple 6.3 AFRL programs**
  - **Developing "leave behind" capabilities**
  - **PEOs engaged in CONOPS and transition**

Vanguard "v0" selection approach was not meant to be a sustaining process for "v2+"

Prior Vanguard-Like Constructs

Prior Examples

- **Developmental Planning Initiatives**

- **Flagship Capability Concepts**

- **Air Force ATDs**

- **ACTDs / JCTDs**

- **SCO programs**

- **DARPA programs**

- **AF Ventures Program**

Common Success Characteristics

- **MS&A role in concept development, validation, selection, and execution**

- **Defined project timeline w/ off-ramps**

- **Frequent demonstrations involving user community**

- **On-going coordination on CONOPs**

- **Top-cover support for program**

- **Committed S&T funding level**

- **External buy-in with "skin-in-the-game" from the beginning**

Vanguard construct is not unique in its goal of providing transformational capabilities with an assured follow-on path; leverage best practices from prior constructs

What Makes a Good Vanguard?

- **Vanguards may vary in scope, risk, and end-state, but each should have the following characteristics to meet Vanguard objectives**

  - **Seeks to develop a transformational Air Force warfighting capability that can provide a sustained advantage over a relevant adversary**

  - **Focuses on coordinated development of one or more 6.3 programs not previously being integrated into a warfighting capability**

  - **Has aggressive but achievable technical objectives, milestones, and end-state, with early testing to assess mitigation of highest risks**

  - **Has DAF/AFWIC buy-in regarding its value in future force design**

  - **CONOPS are deemed credible by relevant operational community**

  - **Has DAF-level commitment to support follow-on activity if threshold end-state criteria are met, including possible Program-of-Record**

There is no "one size fits all" set of criteria for what a Vanguard should be, but these characteristics provide selection guidelines that support the purpose of Vanguards

"Additionality"

- **Many VCs use "additionality" as a key principle when they assess whether an investment in a technology venture is warranted**
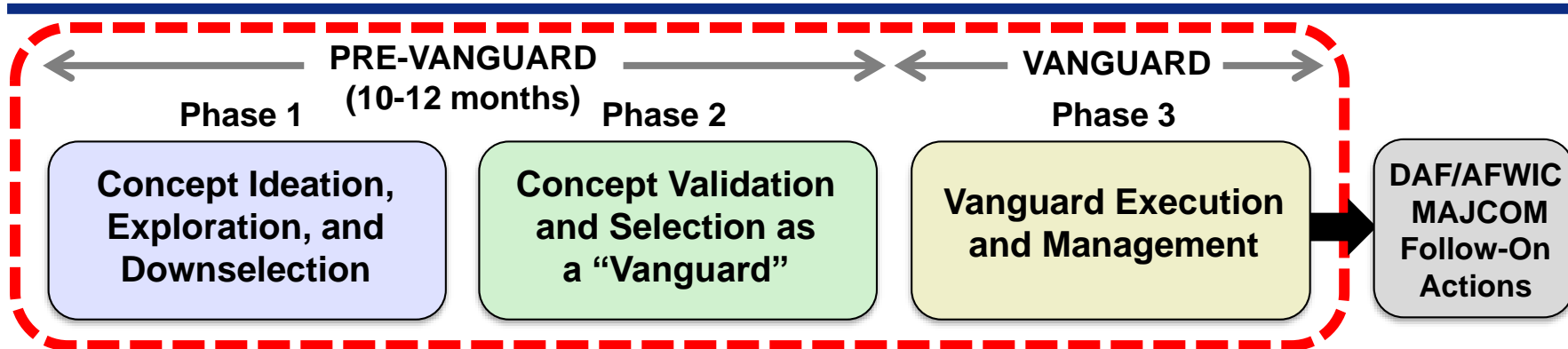
Well-chosen Vanguards should produce a high degree of additionality from the Vanguard investment
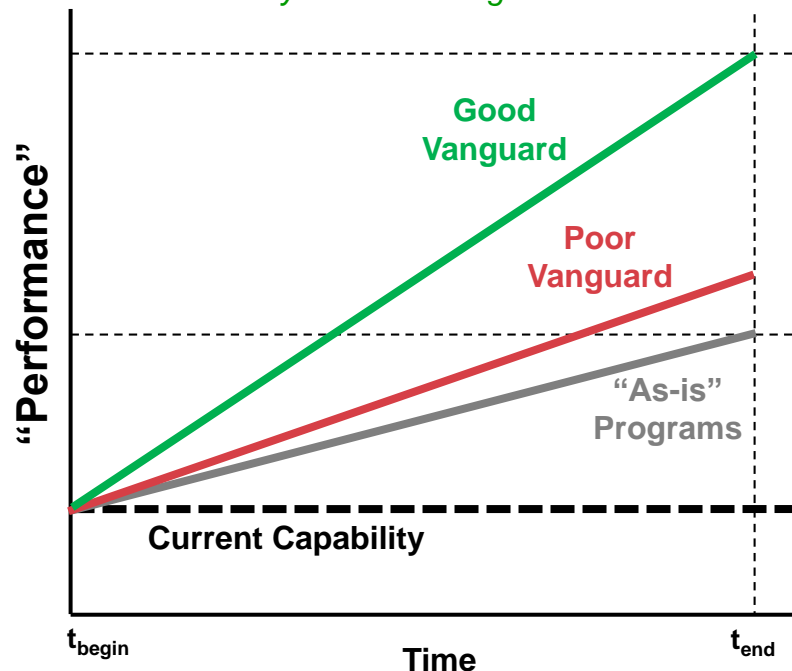
- **Additionality is the <u>added</u> performance that will result if the investment is made, beyond the performance that will occur even if the investment is not made**

- **A useful metric as one part of assessing the suitability of Vanguard concepts**

- **Vanguard must show significant benefit over sum of underlying "as-is" programs**

  - **As-is programs will advance performance even if not part of a Vanguard concept**

  - **A good Vanguard will accelerate maturity and follow-on readiness – reduces time to availability of warfighter capability**

Achieving a high degree of "additionality" is the hallmark of a good Vanguard program

The Vanguard Process Should Have Three Clear Phases

PRE-VANGUARD (10-12 months)

VANGUARD

Phase 1

Concept Ideation, Exploration, and Downselection

Phase 2

Concept Validation and Selection as a "Vanguard"

Phase 3

Vanguard Execution and Management

DAF/AFWIC MAJCOM Follow-On Actions

Phase 1 (9-11 months)

- Develops concepts to meet key warfighting gaps and disruptive opportunities
- Combines disconnected 6.3 technologies to create high degree of "additionality"
- Produces "VC-like concept pitch" for entering Phase 2

Phase 2 (1 month)

- Due diligence to assess concept impact, risk, plan
- Validates sufficiency and rigor of underlying MS&A
- Judges risk mitigation and "get-to-user" action plans
- Recommends validated concept proposals to CDC

Phase 3 (24-36 months)

- Small and flat organization for DevOps-like tempo and rapid decision making
- Mitigating known risks early, finding unknown risks, and continuous user engagement
- Designed to operate the Vanguard "like a startup"

Annual Vanguard selection cycle, with 24-36 month Vanguard execution time

Phase 1: Concept Ideation, Exploration and Downselection
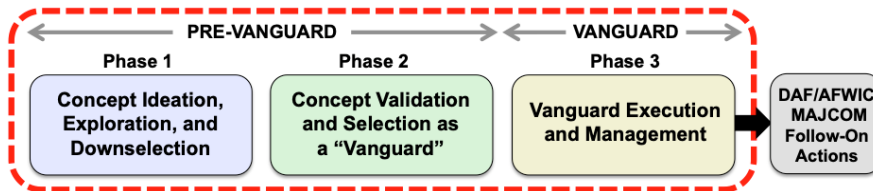
Phase 1

- **Concept Ideation**
  - **Broad participation in front-end concept generation; must involve S&T, acquisition, operational communities, and industry**
  - **Not just AFRL concepts and technologies**

- **Concept Exploration**
  - **MS&A used to clarify disruptive impacts, military utility, and technical risks**
  - **Concept refinement and detailed analyses to improve concepts, CONOPs, and plan**

- **Concept Downselection**
  - **Most concepts will be eliminated; cannot lead to a viable VC-like Vanguard pitch**

- **Phase 1 success is <u>key</u> for obtaining high-impact Vanguard concepts**
  - **Much of Vanguard disruption goal happens during this Phase 1 "VC pitch development process"**
  - **Form multi-disciplinary teams to maximize disruptive impacts**
  - **Set desired end-state for concept; create work-back plan to get there**
  - **Identify technology gaps, CONOPs issues, risk mitigation options**
  - **Aggressive development plan that identifes rank-ordered "risk chain"**
  - **Execution plan seeks to mitigate high-risk elements early in program**
  - **Surviving concepts exit Phase 1 with a viable VC-like concept "pitch"**

Phase 1: Concept Ideation, Exploration and Downselection

Technology Collection
(1 month)

Cast a wide net

- **AFRL**
- **Other DoD**
- **Other Gov't.**
- **Nat'l. Labs**
- **Industry**
- **Commercial**
- **Start-ups**

Vanguard Call

Concept Ideation
(1-2 months)

Initial sorting

CONOPs assessment

Technical assessment

Multi-disciplinary teaming

User engagement

Capability Exploration
(6 months)

MS&A

Concept refinement

Capability development

Identify risks

User engagement

Pitch Development
(1-2 months)

Cost/schedule

End-state goal

Follow-on actions

User/acquisition engagement

Gate 1: TCO Downselects Initial Concepts

Gate 2: AFWIC and TCO Downselect Final Concepts

Many elements of this proposed Phase 1 process are being piloted in WARTECH 1.0; ensure identified risks and technology gaps are fed back to inform AFRL S&T portfolio

Phase 1: Concept Ideation, Exploration and Downselection

- **All-calls for "good ideas" are too broad; AFWIC must provide a more specific "wish list" for Vanguard calls, but be open to additional ideas**

- **Phase 1 participants should include:**
  - **S&T community (TEO, AFRL TDs, Space Force, FFRDCs/UARCs, industry)**
  - **Acquisition community (SAF/AQ, AFLCMC/XZ, Space Force)**
  - **Operational community (AFWIC, MAJCOMs, Space Force)**

- **Emphasis is on concept ideation, then MS&A to assess, refine, clarify and validate each concept, and determining the main risks in it**
  - **Identify technical and integration risks, planned risk mitigation approaches and options, and risk removal costs, for each element of "risk chain"**
  - **AFRL gains insights for 6.2/6.3 "risk-filler" programs that can be run concurrently with Vanguard to provide additional risk-removal options**

- **Provides basis for concept viability assessment and downselection**

Surviving concepts must exit Phase 1 with a clear and analytically supported description of their disruptive impacts, CONOPS, technologies, gaps, options, risks, and cost
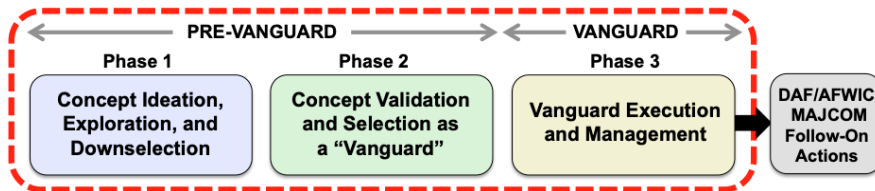
Recommendation #1

Phase 1: Vanguard Concept Ideation, Exploration, and Downselection

- **Use Phase 1 described herein to implement an objective and repeatable process for developing Vanguard concepts that will achieve compelling game-changing capabilities from the best available technical ideas**

  - **Stimulate a robust pipeline of capability-enabling technologies through focused data calls led by AF TCO and AFWIC's Innovative Solutions Division**
    - **Include technologies from a wide range of sources, not only AFRL**

  - **Ideate concepts based on an AFWIC "wish list" and broader disruptive ideas**

  - **Form initial concept exploration teams to provide preliminary assessments of potential disruptive impacts, CONOPS, technologies, and risks**
    - **Engage w/ AFWIC and MAJCOMs for future force design and operational inputs**

  - **Concepts passing first downselection then undergo deeper concept exploration involving rigorous MS&A, concept refinement, and stakeholder engagement**

  - **Final downselected concepts develop "pitch package" w/ analytically supported description of concept, end-state goal, cost/schedule, follow-on options**

Phase 2: Concept Validation and Selection as a "Vanguard"

PRE-VANGUARD

Phase 1	Phase 2	**VANGUARD** Phase 3	
Concept Ideation, Exploration, and Downselection	Concept Validation and Selection as a "Vanguard"	Vanguard Execution and Management	DAF/AFWIC MAJCOM Follow-On Actions

Phase 2

- **Concept Validation**
  - **Validates sufficiency of Phase 1 "pitches"**
  - **Carried out by independent Validation Panels**
    - **Made up of TEO/TCO, AFWIC, AQ**
    - **Augmented by external technical and operational subject matter experts**
  - **Recommends concepts be sent forward for selection or back for more Phase 1 work**
- **Concept Selection**
  - **Validated concepts are sent to CDWG and CDC for consideration as Vanguards**
  - **CDC selections are made based on value judgment of concept and available budget**

- **Validation panels assess Phase 1 "VC-like pitches" prior to selection**
  - **Evaluate disruptive impacts on future warfighting capabilities**
  - **Determines "opportunity value" and "additionality" of proposed concepts**
  - **Also judges sufficiency, validity, and rigor of underlying Phase 1 MS&A**
  - **Evaluates "risk chain" and phased mitigation strategies for key risks**
  - **Assesses completeness and viability of proposed concept execution plan**
  - **Includes proposed "get-to-user" plan with credible follow-on actions**
- **Typically may be able to select at most 1-2 new Vanguards each year**

Phase 2: Concept Validation and Selection as a "Vanguard"

- **Vanguard concept validation should be based on "achieving disruptive impacts by integration of otherwise disconnected 6.3 programs into new high-value warfighting capabilities"; more than "speed to a POR"**
    - **Vanguards require higher level of *risk tolerance* to meet stated goal**

- **Assessments of proposed execution plans should look for focus on *"risk up front"* – i.e., attacking biggest risks early in program**
    - **Called "*out of order*" development in VC community; *take biggest risks first***

- **Vanguard pitches rejected in Phase 2 still provide value to AF S&T**
    - **Helps Phase 1 participants understand perceived weaknesses of concept**
    - **Rejected concepts can be reproposed after additional Phase 1 preparation**
    - **Rejected concepts help inform AFRL transformational S&T portfolio choices**

Independent assessments by Validation Panels of proposed Vanguard concepts from Phase 1 are essential for providing CDC with viable Vanguard choices
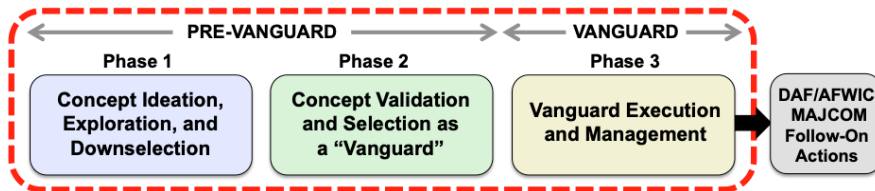
Recommendation #2

Phase 2: Vanguard Concept Validation and Selection

- **Establish a Phase 2 Vanguard Concept Validation Panel, independent of Phase 1 concept teams, to assess highest potential Vanguard candidates**
    - **Panel should be comprised of standing members from TEO/TCO, AFWIC, AQ, augmented by concept-specific technical and operational SMEs**
        - **Consider including experts outside of Air Force; e.g., commercial, VC**
    - **Assesses "VC-like pitch package" for each concept based on:**
        - **Disruptive impact on future warfighting capabilities**
        - **Credibility and rigor of MS&A**
        - **Completeness and viability of execution plan, including cost and schedule**
        - **Feasibility and utility of proposed follow-on actions**
    - **Recommends appropriate next step for each concept:**
        - **Recommend as a Vanguard candidate to CDWG and CDC … or:**
            - **Request further detailed refinement of concept pitch**
            - **Suggest further risk reduction via S&T (6.1-6.3) testing and demonstrations**
            - **Suggest concept be designated a 6.3 Transformational Capability program**

Phase 3: Vanguard Execution and Management

PRE-VANGUARD

Phase 1
Concept Ideation, Exploration, and Downselection

Phase 2
Concept Validation and Selection as a "Vanguard"

VANGUARD

Phase 3
Vanguard Execution and Management

→ DAF/AFWIC MAJCOM Follow-On Actions

Phase 3

- **Vanguard Execution**
  - Execution Team leader must be technical not program manager; PM is TCO role
  - Must be based on limited time, rapid pace, and "good enough" solutions
  - Focused on working down the "risk chain"

- **Vanguard Management**
  - Program management is in TCO
  - Standard program management methods suffice, but need *higher risk tolerance*
  - Willingness to "de-Vanguard" as needed

- **Phase 3 success hinges on properly conceiving the Execution Team**
  - Execution Team members must have the Vanguard as their only role
  - Must be involved in and "fully on board" with program plan, end-state
  - Should be executed "like a start-up"

- **Execution/management plan is customized for Each Vanguard**
  - Timeline, milestones, off-ramps
  - Planned end-state and exit criteria
  - User engagement, follow-on plans

- **Continuous (not episodic) user engagement is essential for success**
  - Establish Vanguard-specific O-5/O-6 "Capability Advisory Group"

Phase 3: Vanguards Should be "Operated Like a Startup"

- **Emphasis on disruptive innovation, rapid pace, agility, and delivery of end-state capabilities to users requires a "startup-like operating model"**
  - **Separate program management from technical execution, so small, flat, agile technical execution team can focus solely on maximizing technical progress**
    - **Board of Directors led by program manager in TCO maintains "thin line" control of technical execution team and serves as the interface to AFWIC**
    - **Provides personnel oversight, and recognition from within the "company"**
  - **Dedicated, agile technical execution team must have diversity of technical capabilities and strongest possible technical depth**
    - **Team size, skill sets, and *mindset* must support DevOps-like execution, rapid decision making, and urgency to *"get product to the user"***
    - **Frequent prototyping, testing, and experimentation to inform decisions for quickly developing *"good enough"* capabilities for users**
    - **"Risk up front" approach focused on successive *burndown of risk chain***
  - **Frequent all-voice meetings to solve issues (technical, process, organization)**

Vanguards require a fundamentally different operating model than do traditional programs

When is "De-Vanguarding" Appropriate?

- **De-Vanguarding is CDC-level decision to remove Vanguard designation and resourcing from an on-going Vanguard program**
  - **Continuous monitoring of progress and issues in a Vangaurd is done by its Board of Directors; if appropriate it recommends de-Vanguarding to CDC**

- **Potential reasons (exit criteria) for de-Vanguarding include:**
  - **Unacceptable performance shortfalls with no viable recovery options**
  - **Unmitigatable technical or integration issues in an essential program aspect**
  - **Unacceptable increases in projected remaining cost and/or schedule**
  - **Became unnecessary or obsolete (e.g., changes in technology, threat, etc.)**
  - **Better opportunities became available (e.g., alternate means to achieve same or similar capability; more impactful capability is now achievable, etc.)**

- **De-Vanguarding gives feedback to AFWIC, MAJCOMs, AFRL, industry**
  - **e.g., informs need for possible new programs in AFRL 6.2/6.3 S&T portfolio**

Inherently high risks in Vanguards make occasional need to de-Vanguard both expected and necessary; de-Vanguarding is not the same as "failure"

Recommendation #3

Phase 3: Vanguard Execution and Management

- **Implement Vanguard program management practices described herein, leveraging successful examples of agile, rapid technology development in the government, commercial marketplace, and the venture community**

  - **TCO to act as VC managing Transformational Portfolio**
    - **Fund and oversee Vanguards and other 6.3 transformational programs**
    - **Mine and develop pipeline for future Vanguard candidates**

  - **Establish "Board of Directors" led by TCO for each Vanguard**

  - **Create Vanguard program offices and execution teams with "start-up" culture, mindset, and the corresponding set of management practices identified herein**
    - **Separate program management role from focused technical execution team**
    - **Provide PMs with autonomy and agility to manage programs, with aggressive timeline to get at least a minimum viable product (MVP) to users**
    - **Ensure Vanguard personnel management, oversight, and recognition come from within the "start-up company", even if personnel are matrixed from elsewhere**
      - **Execution team will give full commitment to the organization that evaluates them**

Recommendation #4

"De-Vanguarding"

- **Implement a disciplined decision-gate process in each Vanguard project timeline, with "de-Vanguarding" where appropriate as described herein**
  - **Assess progress against milestones, performance goals, development risks, and projected readiness for potential follow-on actions**
  - **Periodically determine projected "additionality" based on current program state and currently anticipatable end-state, and de-Vanguard if/when appropriate**
    - **e.g., unmitigatable technical issues, threat change, alternate capability**
  - **De-Vanguarding assessment for any given Vanguard is performed by its "Board of Directors", with recommendations provided to CDC for decision**
  - **Potential actions after de-Vanguarding may include:**
    - **Technology and/or concept spin-offs to other projects**
    - **Starting new 6.1/6.2 programs to address gaps**
    - **Further development of component technologies in 6.3 portfolio**
  - **De-Vanguarding ≠ failure!**

Vanguard End-State and Follow-On Actions

- **Every Vanguard has an *intended* end-state in its program plan and an *actual* end-state upon its completion (e.g., residual asset or capability)**

- ***Transition success* should *not* be defined solely as a Program-of-Record; other equally valuable follow-on actions may be more appropriate**
    - **Operational experimentation with end-state assets or capabilities**
    - **Capability demonstration with a non-fieldable prototype**
    - **Integrated system that can be provisionally used in the field**
    - **Insertion into a follow-on program**
    - **Direct entry into operational use**
    - **Commercial development**

- **DAF/AFWIC-directed follow-on actions could include:**
    - **Further SDPE-led experimentation with end-state assets/capabilities**
    - **MAJCOM direction to explore MU/TTPs using end-state assets/capabilities**
    - **Cross-Service experimentation with end-state assets/capabilities**

A successful Vanguard may lead to follow-on actions other than a Program-of-Record

MU: Military Utility

Recommendation #5

Vanguard Deliverables and Follow-On Actions

- **Define the meaning of Vanguard "transition success" more broadly than just becoming a Program-of-Record, but require agreement on specific Vanguard "follow-on actions" as part of Phase 2 selection criteria**
  - **As part of Vanguard concept "pitch" entering Phase 2, identify set of potential end-states and corresponding follow-on actions as described herein**
  - **Follow-on actions and associated provisional funding plans must be agreed upon by relevant entities (e.g., AFWIC, PEO, MAJCOM, TCO)**
  - **Vanguard end-state should be a residual asset or capability that could enable:**
    - **Further SDPE-led experimentation**
    - **Fieldable prototypes**
    - **MAJCOM direction to explore TTPs or conduct MUA**
    - **MAJCOM-funded follow-on capability development**
    - **Air Force corporate-level funding of a Program-of-Record**
  - **Coordinating appropriate follow-on actions is a key role for DAF and AFWIC**

MUA: Military Utility Assessment

AFWIC Role is Essential for Vanguard Success

AFWIC Mission: Drive integration through centralized enterprise design and capability planning

- **Success of Vanguard initiative depends on AFWIC's ability to:**

  - **Articulate key gaps and disruptive opportunities to inform Vanguard concepts that support "Future Force Design" and "Theory of Victory"**

  - **Connect AFRL and TCO with emerging CDC and MAJCOM priorities**

  - **Assist with MS&A for Phase 1 concept development/downselection**

  - **Validate candidate Vanguard alignments w/ Future Operating Concept**

  - **Recommend prioritized list of candidate Vanguards to CDC**

  - **For on-going Vanguards, align 6.4 prototyping funding to enable them, and defend planned Vanguard funds in Air Force budget process**

  - **Recommend continuation or de-Vanguarding of existing Vanguards**

AFWIC is a relatively new organization that must quickly reach its full mission capability to achieve the transformational future force capabilities that Vanguards seek to provide

Vanguards Must Have DAF-Level Commitment

- **If a future warfighting capability is "potentially transformational enough" to be a Vanguard, then it warrants DAF-level attention**

  - **Vanguards are not simply AFRL technology demonstrations; they are AF efforts to test viability of transformational warfighting concepts**

  - **Vanguard initiative requires AF enterprise coordination of support from acquisition, operational, S&T, and test communities**

- **Without DAF-level commitment to the Vanguard initiative, it will not provide the transformational capabilities being sought**

  - **DAF leadership must signal top-cover and risk tolerance for inherently high-risk programs that seek to enable leap-ahead capabilities**

  - **AF Council will need to make resource allocations for Vanguard follow-on actions; may involve directing MAJCOM follow-on roles**

The Vanguard initiative will not succeed in delivering game-changing capabilities unless it has strong, visible, and sustained commitment at the DAF level

Recommendation #6

DAF-Level Commitment and Support

- **Demonstrate strong, visible, and sustained DAF-level commitment to the Vanguard initiative, to on-going Vanguard programs, and to resulting Vanguard follow-on actions**

  - **Champion and provide top-cover for inherently high-risk but potentially game-changing Vanguard programs**

  - **Ensure participation of acquisition, operational, S&T, and test communities during Vanguard concept development and validation phases**

  - **Coordinate as needed to enable Vanguard follow-on actions**

  - **Accelerate achievement of full AFWIC mission capability to ensure it defines key gaps and disruptive opportunities for transformational future force capabilities that Vanguards seek to provide**

Summary of Recommendations

	Recommendation	Suggested Implementation Timeline*	Suggested OPR
1.	Implement an objective and repeatable process for Vanguard concept ideation, exploration, downselection	Vanguard 2+	AF TEO
2.	Establish independent Phase 2 Validation Panel to assess high potential candidates and make Vanguard selection recommendations	Vanguard 2+	SAF/AQ AF/A5
3.	Implement "start-up-like" Vanguard program management and execution practices	Vanguard 2+	AF TEO
4.	Establish disciplined decision-gate processes, and de-Vanguard as appropriate	Vanguard v1	AF TEO
5.	More broadly define Vanguard "transition success"	Vanguard v1	SAF/AQ AF/A5
6.	Ensure DAF-level Vanguard support	Vanguard v1	CDC

* Identify earlier opportunities to pilot when possible