
# Open Innovation Campus (OIC) Business Model

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**Agility Innovation Partnerships**

**are ALL required to compete in today's exponentially changing technology landscape!**

**In order to enable superior collaboration, the AFRL Information Directorate is developing an *Open Innovation Campus* to provide an enhanced environment fostering discovery and technology advancement through fundamental scientific research.**

# Goal and Strategy

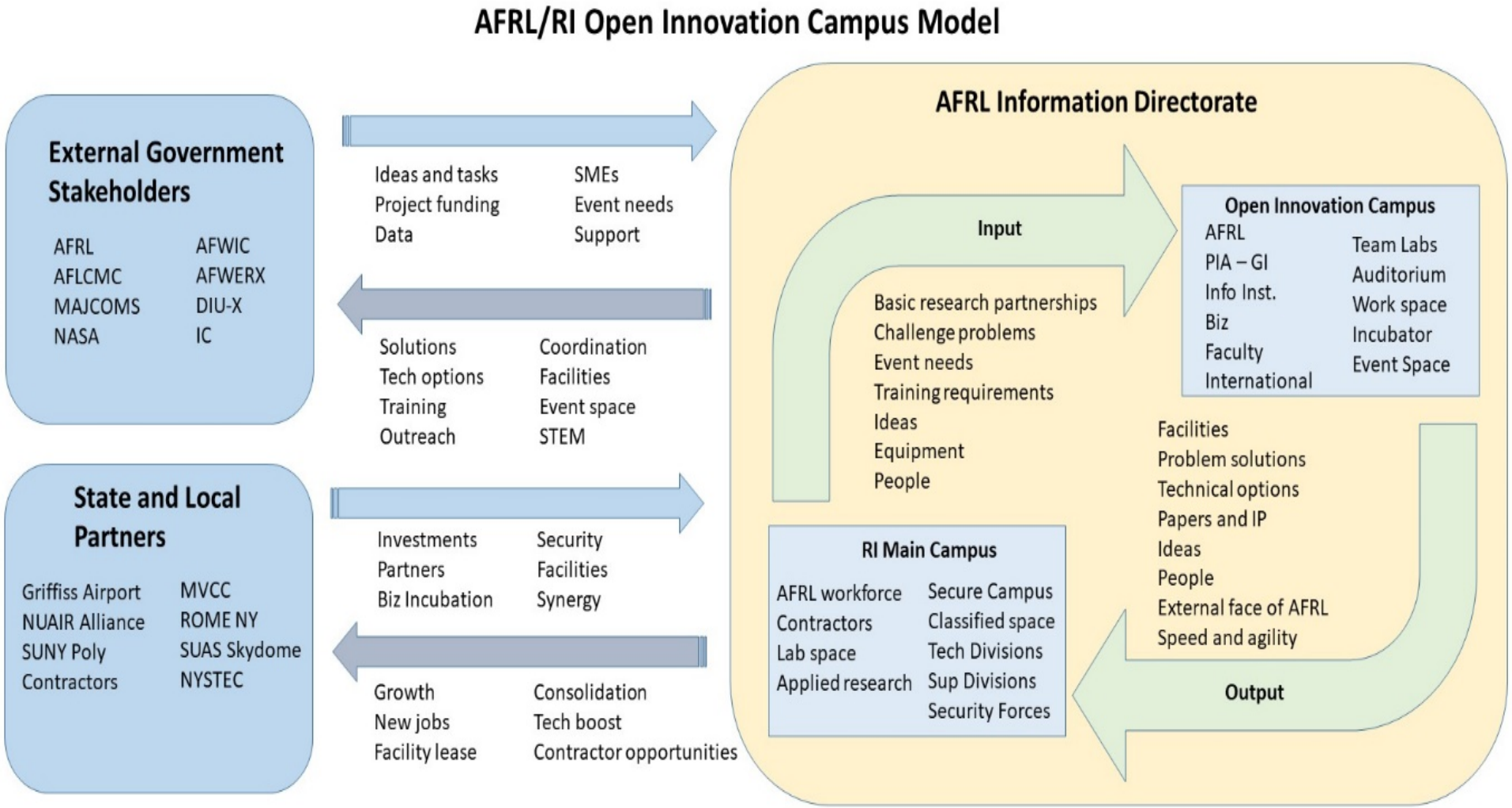
- **Goal:** Develop an agile and transformative ecosystem at Griffiss Technical Park, connecting global technology leaders to collaborate and solve complex Air Force computing challenges. **Linking** researchers from government, industry, and academia, to share the best and brightest people, ideas, and facilities virtually and in person.

- **Strategy:** Create an innovation eco system outside of the AFRL boundaries for external outreach and collaborations, combining the PIA partners, commercialization, open campus, and other open innovation models together in a business model

"We will emphasize new skills and complement our current workforce with information experts, data scientists, computer programmers, and basic science researchers and engineers-to use information, not simply manage it. " - Secretary of Defense, James Mattis - **2018 National Defense Strategy**

"Evaluate service pilots similar to the U.S. Army Research Laboratory's Open Campus, potentially expanding engagement and formally integrating them into Air Force procedures" – U.S. Air Force 2030 Science and Technology Strategy

# Open Campus Concept of Operations



# Step 1: Challenge Statements

- A key component to the success of the OIE is having a set of challenge problems to engage potential partners on versus assuming “If we build it, they will come”
- The challenge problems (next slide) were created in conjunction with the Core Technical Competency (CTC) leads as areas that would compliment their strategic visions but we don’t have active work in today – e.g. Seedling areas for future work
- Will distribute a slick sheet to our partners
- Envision that this is updated yearly around 1 January to validate challenge problems

# Challenge Statements

- **What AF problems can take advantage of quantum information processing and how do we optimize these problems to the ever scale quantum hardware?** - Quantum Algorithm Optimization and Development on Prototype Quantum Computers with IBM, Google, QCWare, etc.
- **In the World of IOT, what alternative hardware is needed to support machine learning?** - Neuromorphic Computing Hardware for Size, Weight, and Power Limited Systems - Much of current machine learning is focused on software, but especially when you consider Internet of Things devices, we need different kinds of hardware and likely different machine learning algorithms than simply ANNs
- **How can ML technology overcome adversarial attacks and data contamination?**
- **How can ML theory and methods to enable the rapid training and/or adaptation of predictors using a small number of labeled training examples?**
- **How can we better characterize and manipulate software?** - Can we model software, in an abstract space such that we can: Make statements about its correctness / absence of classes of bugs? Analyze its runtime behavior? Quickly ascertain the function, operation, or effect of a piece of code within a given system/context? Identify necessary changes/updates to software to meet a new specification?
- **How do we represent and reason about a cyber situation / environment / mission?** - To date, most of the work relative to machine learning in cyber have focused on pattern recognition (e.g. attempts to recognize APTs), focusing only on one data type. Additionally, most recent advancements in learning algorithms generally have been limited to real-valued data environments, absent other sources or types.
- **How do we do distributed C2 in contested environments with verifiable composable C2 systems?** - Research areas include control theory, distributed systems, fault-tolerant systems, systems of systems, and formal methods
- **What does quantification of multi-domain effects look like?** - Research areas include adaptive sampling, probilistic modeling, and uncertainty theory

# Challenge Statements, cont.

- **To what level can be make security (reliability, robustness) guarantees?** - To date, most work on security guarantees has focused on formal methods, which have proven themselves promising for small systems. Even with formally verified element(s) (e.g. a trusted processor or formally verified application), there is still a need to interface with non-(formally) verified hardware, software, and networks. This condition gives rise to the possibility of emergent security failures and inappropriate levels of trust/functionality being placed into the system.
- **How can we derive and quantify meaningful, explainable indicators in cyberspace?** - The space of metrics and measures in cyberspace is vast and diffuse. Despite the vast literature on the subject, few of these measures have been subjected to rigorous and repeatable experimental validation, leaving open the question of their validity or scope. Coupled with this is the need for measures and metrics whose purpose and meaning are inherently explainable and easily incorporated into algorithms, analyses, and reports.
- **How do we efficiently analyze models for operational domains?** - Specifically looking at accuracy, performance, reinforcement learning, etc.; improved training data
- **How to we verify trust and deception?** - Specifically Publicly Available Information (PAI) Veracity and Acoustic speech modeling
- **How do we perform better conversational analytics and confirm trust in speech?**
- **What is the optimal waveform for different scenarios?** - Constraints include user mobility, latency, interference, and power
- **What is the optical scheduling for users to communicate?** - Constraints include topologies, latency, and unknown number of users.
- **How does a system learn in-mission and adapt to the mission environment?** - In order to do decision making from limited data the research areas include transfer learning, domain adaptation, self-supervision, interactive learning, reasoning under uncertainty, and active learning

# Step 2: OIC Commitments Today

- Quantum Information Science (Both 1st and 3rd Floor)
  - Planned use for 3+ years
  - Proposed partners: RIT, UMD, Syracuse, SUNY, IBM, PsiQuantum, IonQ, Austria, Australia, Canada, Singapore, UK, Netherlands – Team is working on commitments currently
- RIPE – RIE Rapid Test Cell
  - Greg Horvath has spearheaded this effort and is focusing the first effort on adversarial autonomy
  - Hosted at current Griffiss Insitute, currently ~5-6 Govt supporting and will ramp up to ~13 this summer with faculty supporting effort
  - Exploring relationship with DSTL and other universities to join RIPE
- Mini-Kessel Run (KREL)
  - Effort to spearhead replicating tool chain and environment of KREL here in Rome to be able to develop directly for the AOC
  - Project will be kicked started this summer via Directorate Cyber Vulnerability Assessment Team (DCVAT) team (w/ 6 ACE Interns) and 2 KREL placements
- ACE
  - Summer Use only – 40-50 students/instructors at a time
- Small Business Outreach
  - AFRL/RI Small Business Office will host an open-door environment once a week in the OIC. This will enable outreach to small businesses looking to discuss AFRL contracting opportunities as well as ensure that partners in the OIC are aware of the resources the AFRL/RI Small Business Office can offer

***PLUS all the great things our PIA partners do today!***

# In Development Technical Challenges

- In Progress Technical Commitments
  - Current cyber programs hosted at Griffiss Institute today
  - AFOSR Challenges – AFRL/RI has engaged with the AFOSR community on multiple occasions and have paths forward with multiple PIs on potential collaboration opportunities
  - AFRL/RIG is pursuing creation of SEL4 Community of Excellence (COE) hosted out of OIC
  - Citigroup – Identified Text Extraction/CVA Interest Areas with critical industry partner

# In Development Corporate Relationships

- SUNY Poly
  - Developing workshops to be hosted in OIC via Systems Engineering Masters program
- SUNY Poly CAT on AI/ML
  - If successful, will be co-located within the facility
- Syracuse University
  - SU is looking to corporately reestablish defense relationships, including with AFRL
  - SU is socializing relationships with Chancellor, etc and looking to come out to do a leadership visit
- MD5
  - Established relationship with Dan Madden and MD5, one of the organizations that hosts Pitch Days, including the recent AI/ML Pitch Day in NYC that we were invited to attend
  - AFRL/RI is pursuing future Pitch Day opportunities with Mr. Madden
  - Mr. Madden is additionally looking at doing introductions to NYC universities to socialize challenge problems
- Universities
  - Will continue to approach universities to establish opportunities to participate in no-cost efforts to mentor students and work on challenge problems, e.g. Senior Projects
- AFWERX
  - AFRL/RIB is actively pursuing opportunities with AFWERX, in the beginning stages currently
  - Flyleaf program has an active project with AFWERX Vegas and are evaluating future opportunities
- University of Wisconsin Classes via COE
  - AFOSR will coordinate having some of the courses/workshops from the Wisconsin AL/ML COE replicated here in Rome

# Step 3: Outside the Fence Space Options

- Griffiss Institute Move
  - Nearly 40k of available space split between three floors at Bldg 100 at the Oneida County Airport
  - GI is renting this space from the County and will expand their potential scope of work and capabilities
  - Keeps Closed/Closed and Open/Open concept where AFRL can expand capabilities to work with partners while keeping secure work more inaccessible
  - Allows expansion of ‘hard lab’ space in open domain research areas for collaboration with foreign entities or non-citizens
  - Gives rapid prototyping spaces and open internet domain access for open research that is not easily accessible from the Laboratory
- New NYSTEC facility
  - Will have an additional ~5k worth of collaboration space that they’ve made available for our use to work on their PIA related activities

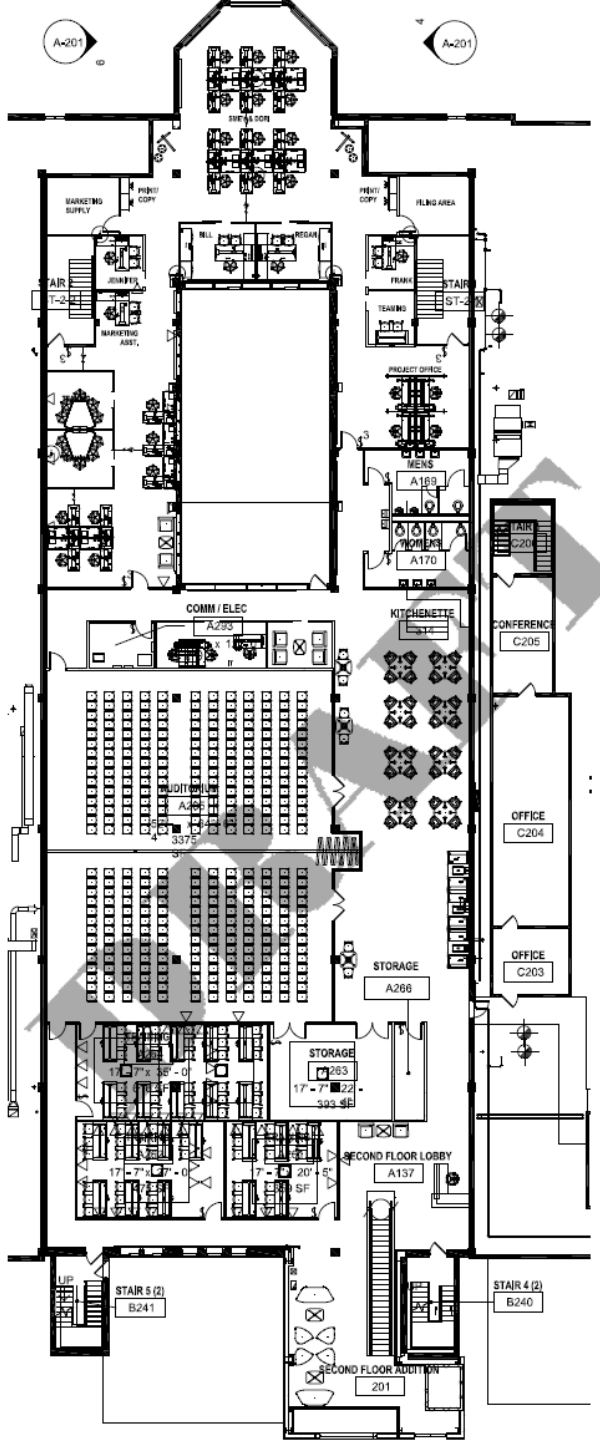
# Current State – First Floor

- In progress – Two quantum labs and two neuromorphic/electronic labs
- Technical teams are actively engaged and working with the GI to ensure equipment and facility support meets requirements

# Current State – Second Floor

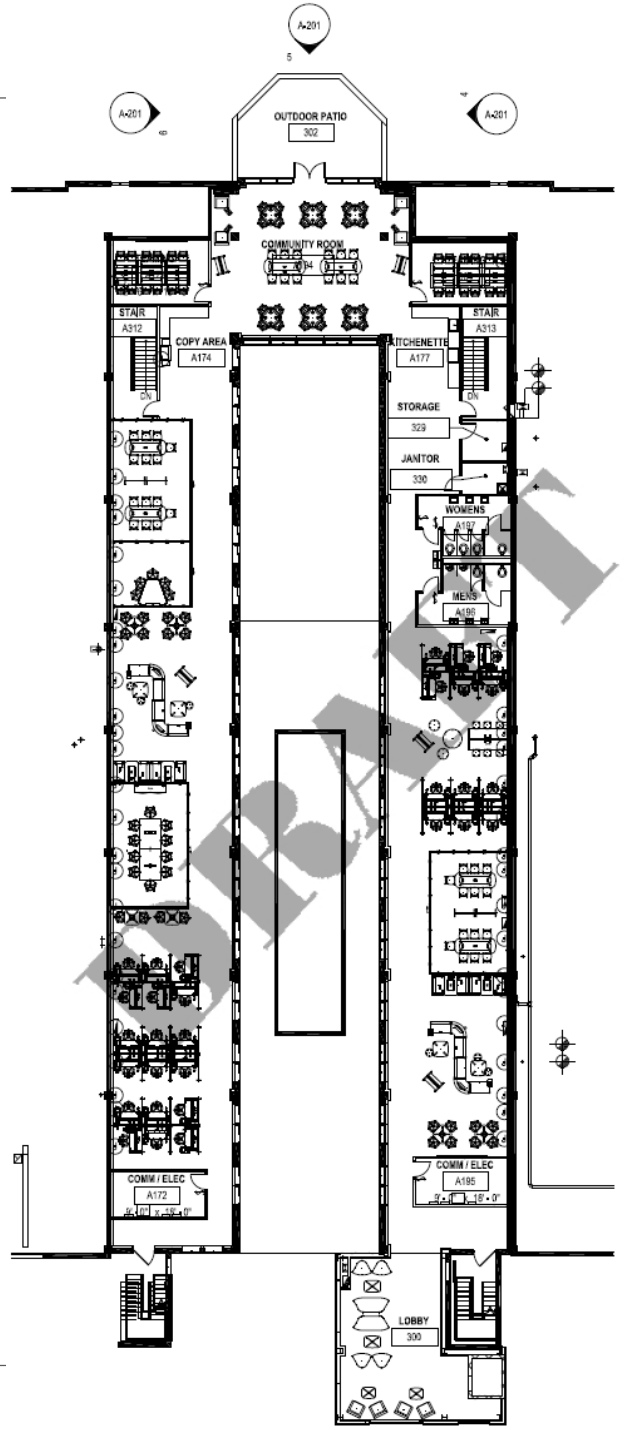
There is about 11,00 square feet of “event” space the will be split up as follows:

- A reconfigurable Auditorium that can seat up to 250 people.
- The auditorium has a retractable wall that can split the room into 2 separate rooms.
- Lobby meeting area outside of the auditorium
- 2 training/class rooms – one holds approximately 30 students and the other holds approximately 20 student
- 1 Small class room/board room – holds approximately 15 students
- 1 small teaming room for 4 people
- Kitchenette area to handle catering for events
- Small gathering/open area near escalator for small group discussions or individual activities



# Current State – Third Floor

- ~10 different work areas - Varying sizes so it's not "One size fits all" mentality
  - Approximately 175 personnel can fit on the third floor for use
    - Can comfortably fit current summer needs (~150) with room for additional projects throughout
  - GI will put a scheduling system in place to allow employees to know where there is space real time and schedule long term areas for use



# Activities Completed/In Progress

- Requirements for construction have been worked via AFRL/GI/Airport and RFP for construction is in progress:
  - Schedule:
    - 75% submission — June 3
    - 90% submission — June 17
    - 100% submission — July 2
    - Bid docs — July 16
    - Bids due — Aug 12
    - Contract award — Sept 3
    - COO (cert of occupancy) — March 3, 2020

# Active To Dos - Way Forward – Slide 1

- Visit other Innovation Environments
- Evaluate current CRADA relationships – In progress
  - Steve Colenzo working through current relationships to see what ongoing partnerships can benefit from increased resources
- Create Communications Plan for Interaction with OIC partners
  - Establish how will accomplish tasks jointly between teams in accordance with MOUs
  - Create a strategic outreach plan so we're continuously looking for new opportunities through the business model even if we're "full"
- Evaluate current OIC "Buy-Ins" (e.g. Google, etc) for firm relationships against challenge problems
- Engage Security for Anti-Terrorism
  - Security Team has done an initial walkthrough of the County facility to create a security plan and anti-terrorism recommendations

# Active To Dos – Way Forward – Slide 2

- International CRADAs
  - AFRL has not historically utilized these types of agreements and are working actively with HQ to ensure all opportunities are available for partnerships
- Corporate Communications Guide to OIC
  - Currently working on slick sheet for challenge problems
  - Will expand into more DISTRO A promotional material, including a welcome and visitors guide
  - GI will host a permanent web solution on how to engage with Open Campus
- Logistics Plan for OIC
  - Establish more robust equipment tracking mechanism with Logistics for OIC
  - Ensure that research done on open internet is within regulation
- Engage NYSTEC further on use of their space and keep status of opening date
- Engage with AFRL Intrapreneur – Ryan Helbach

# Frequently Asked Questions

- Can anyone get space?
  - Yes, if you have a partnership with AFRL (e.g. Not a contract) and agreement from AFRL – This includes our support functions. Col Lawrence wants to prioritize those with active partnerships in conjunction with OIC intent
- How can we help?
  - If there is interest in establishing a new or expanding an old partnership in alignment with the challenge problems please bring it to our (Myself or Mr. Colenzo) attention sooner. This way we can ensure that we're prepared for longer term use and the equipment/logistics is ready
  - Help promote the challenge problems to your contacts and let them know we're looking at more out of the box opportunities to work with them – Our goal is to have 8-10 active relationships ready to work in the 3rd floor in a year