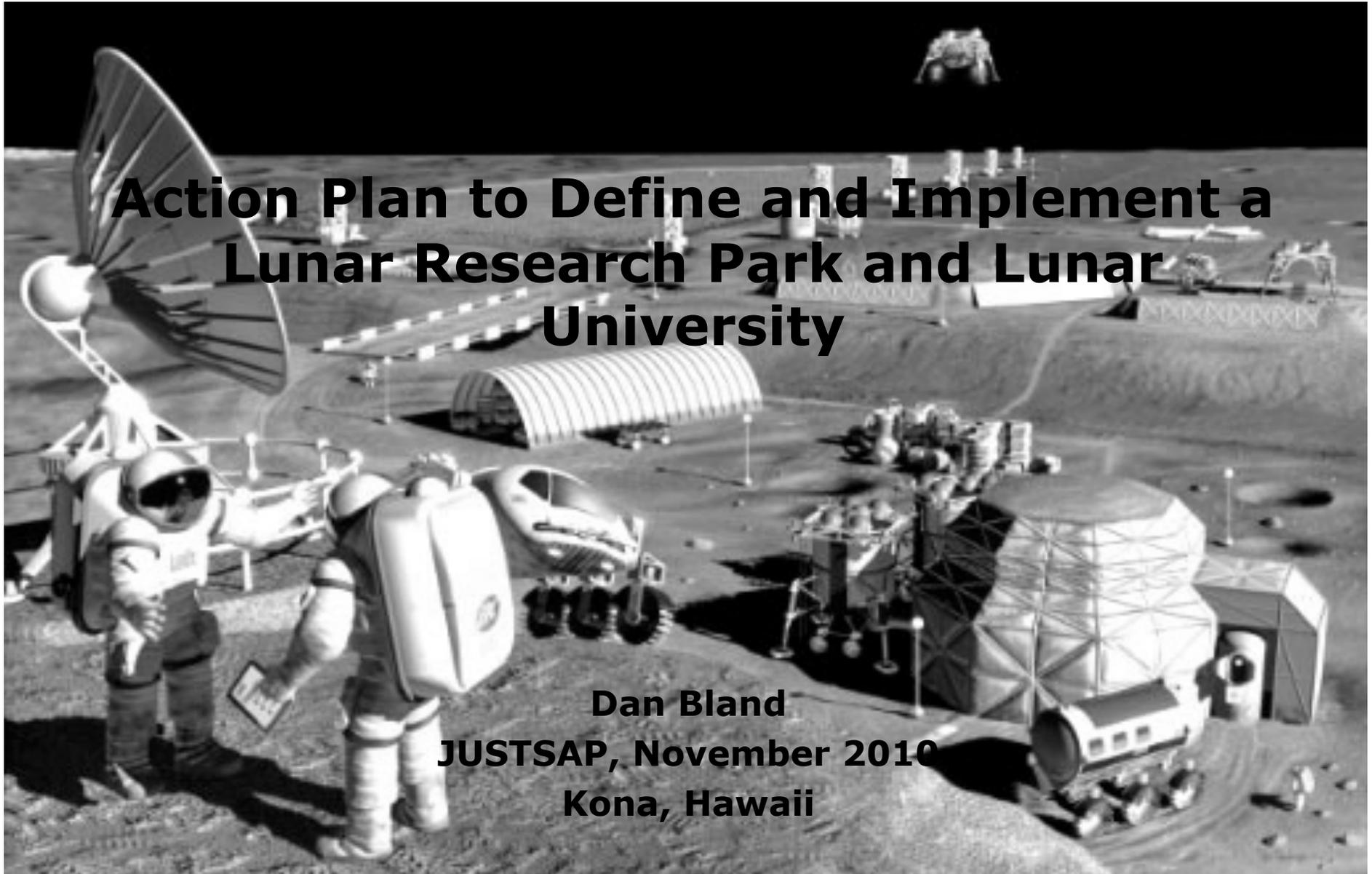




# Action Plan to Define and Implement a Lunar Research Park and Lunar University

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JUSTSAP, November 2010  
Kona, Hawaii





## ➤ **Assumptions - for Plenary Panel Discussion**

- 1. To succeed, the NASA ARC concept of a Lunar Research Park and Lunar University must be strongly supported by NASA - and eventually by other Agencies – and become a part of a stable, international exploration architecture.**
- 2. The LRP & LU primary ground analog sites will be located on The Big Island of Hawaii; however, there may be other secondary analog sites.**
- 3. Consistent with the objectives of the NASA/HI SAA, JUSTSAP (or its successor organization) will have a “facilitator” role, recognized by NASA, to incubate the LRP & LU program and to promote Program advocacy within the State of Hawaii, as well as with other space-faring nations.**
- 4. UH/PISCES will have a “Space Center” role, ancillary its NASA ARC “customer”, in developing LRP & LU support facilities and infrastructure, and with responsibility for management and oversight of the “Lunar University” aspect of the Program.**
- 5. The Lunar University “student body” will be Earth-based but lunar-dependent, participating in early Village design studies/contests, analysis of lunar Village telemetry data, and eventual instructional interface with astronaut/scientist “professors” from the moon.**
- 6. The LRP & LU will evolve from a Lunar Robotics Village to a Habitable Research Park over the next few decades, using a phased approach to meet the following LRP/LU evolutionary milestones:**



## ➤ **Key Milestones - for Plenary Panel Discussion**

- **Concept Legitimacy: Facilitate international LRP & LU White Paper, stakeholder advocacy, early leadership responsibilities and forward plans**
- **Program Definition: Achieve consensus on LRP & LU Program requirements, element definition and development strategies, emplacement tactics, implementation schedules and funding priorities**
- **Program Partnerships: Establish international partnership roles and responsibilities, supporting agreements and agency funding for LRP & LU elements, launch vehicles, and ground support infrastructure development and operation**
- **Elements Design & Development: Meet all initial LRDP & LU design; development, test and evaluation (DDT&E) program milestones**
- **Program Implementation: Initial LRP & LU elements and operations**



## ***CY 2010-11: LRP & LU Concept Evolution-Phase I***

***Concept Legitimacy Milestone: Facilitate international LRP & LU White Paper, stakeholder advocacy, early leadership responsibilities and forward plans***

- **JUSTSAP 2010: identify LRP & LU concept and relationship to NASA/HI SAA, JUSTSAP, PISCES**
- **Identify NASA ARC, JUSTSAP, PISCES and Other “LRP & LU Steering Group” members this week**
  - “Core” membership composed of JUSTSAP Steering Committee and PISCES Management Team
  - Other members as deemed appropriate by core members
- **LRP & LU Steering Group develop detailed LRDP White Paper document which (typically) describes in broad terms:**
  - Incremental research , applications, operations and educational objectives
  - Emplacement schedule considerations and targets
  - Extensibility to NEO, L1/L2, Mars exploration
  - Plan for Earth-based analog(s)
  - International participation opportunities and considerations (partners, treaties, export control, etc)
  - International policy/treaty/legal considerations
  - LRDP Operations Task Force charter as next step



## ***Phase I (continued)***

- **LRP & LU Steering Group submits White Paper to their respective space agencies, other government organizations, private sector stakeholders, aerospace forums such as the *International Space Exploration Coordination Group (ISEC)* and selected universities.**
- **LRP & LU Steering Group members obtain funding commitments for LRP & LU Operations Task Force from their respective government organizations.**
- **LRP& LU Steering Group identify LRP& LU Operations Task Force membership, charter, goals, schedule and deliberation location(s)**



## **CY 2012: LRP & LU Operations Task Force-Phase II**

***Program Definition Milestone: Achieve consensus on LRP & LU Program requirements, element definition and development strategies, emplacement tactics, implementation schedules and funding priorities***

- **Convene LRP & LU Operations Task Force at NASA ARC- similar in scope and charter to the 1986-87 ISS Operations Task Force co-chaired by NASA JSC and JPL and convened in Washington, D.C. and Cape Canaveral, Florida. International and private sector participation encouraged!**

**Note: The membership of this group MUST include representatives from each of the actual implementing and user organizations (engineers, operators, scientists, educators etc)**

- **Establish Task Force working groups to develop an LRP & LU Implementation Plan which addresses the following:**
  - Site(s) Location Considerations: Accessibility, Utility, Extensibility
  - Research , Applications and Educational Objectives and Implementation Roadmap
  - Lunar-based Systems and Facilities Infrastructure and Delivery Methodology
  - Earth-based Systems and Facilities Infrastructure
  - Supporting Technology Requirements and TRLs
  - Lunar Surface Operations and Logistics Support
  - Lessons Learned from Intelsat/ISS/Antarctica/Lunar/Mars Analogs
  - Commercial Opportunities/Incentives
  - Legal / Regulatory Considerations
  - Phased robotics, then human capabilities
  - Projected Program Costs and Schedule



## **CY 2013: Implement LRP & LU Program Mgmt Responsibilities, International Agreements, Funding and Procurements-Phase III**

***Program Partnerships Milestone: Establish international partnership roles and responsibilities, supporting agreements and agency funding for LRP & LU elements, launch vehicles, and ground support infrastructure development and operation***

- **Develop and ratify government interagency agreements defining roles and responsibilities**
- **Identify private sector (commercial) roles and responsibilities**
- **Agencies and universities obtain required multiyear funding commitment**
- **Compete and award required government, university and industry contracts for LRP & LU elements , launch vehicles and ground support infrastructure**
- **Establish corporate ownership of commercial products and services**



## **CY2014-15: LRP/LU Design, Test and Build-Phase IV**

**Elements Development Milestone: Meet all initial LRP & LU design; development, test and evaluation (DDT&E) program milestones**

- **Define launch vehicle systems interface documentation**
- **Build LRP & LU surface and orbital systems hardware/software**
- **Perform analog test and verification as applicable**
- **Perform launch vehicle payload integration test and verification as applicable**
- **Develop and perform end-to-end checkout of ground support facilities**



## CY2016-20\_\_ : LRP & LU Implementation-Phase V

*Program Implementation Milestone: Initial LRP & LU elements emplacement and initiation of operations*

- **Initiate LRP & LU ground support facility operations**
- **Launch, emplace and commission orbital support systems (LEO, LLO, GEO, L1 as required)**
- **Launch, emplace and commission robotic lunar surface systems**
- **Begin robotic lunar research and applications**
- **Begin university coursework at selected U.S. and international universities**