Outline

• EPO Overview
  • Audiences
  • Deliverables

• Development achievements per audience group
  • Citizen Science
  • Multimedia
  • Education
  • General public

• Opportunities for Sci Collab member participation
  • Areas where EPO needs expert assistance!

• Conclusions
LSST Project Organization Structure

**LSST Director:** S. Kahn – SLAC  
**Deputy Director:** Z. Ivezic – UW

**Project Manager:** V. Krabbendam – AURA  
**Project Scientist:** Z. Ivezic – UW  
**Deputy PM Software:** W. O’Mullane – AURA  
**Deputy PM Camera:** V. Riot – LLNL  
**Deputy PM Chile:** TBD – AURA

**Project Administration**

- **Project Controls:** K. Long – Longhorn  
- **Business Manager:** D. Calabrese – AURA  
- **ITSI Manager:** J. Kantor – AURA

**Performance and Safety**

- **Safety:** C. Gessner – AURA  
- **Compliance:** V. Kinnison – AURA  
- **Information Security:** Alex Withers – NCSA

**Project Office**

- **Advisory**
- **Project Support**
- **Sub-systems**
- **LSST Ops**

**Project Advisors**

- **Chief Scientist:** T. Tyson – UC Davis  
- **SAC Chair:** M. Strauss – Princeton  
- **Project Science Team**

**Project Communications**

- **Communications Mgr:** R. Gill – AURA

**Data Management**

- **DM Project Manager:** W. O’Mullane – AURA  
- **DM Project Scientist:** L. Guy – AURA

**Camera MIE**

- **Camera Project Manager:** V. Riot – LLNL  
- **Camera Project Scientist:** S. Ritz – UCSC

**Telescope and Site**

- **T&S Project Manager:** W. Gressler – AURA  
- **T&S Project Scientist:** S. Thomas – AURA

**Education and Public Outreach**

- **Head of EPO:** A. Bauer – AURA
LSST EPO's mission is to offer accessible and engaging online experiences that provide non-specialists access to, and context for, LSST data so anyone can explore the Universe and be part of the discovery process.
LSST Education and Public Outreach

Audience

- Citizen Science Principal Investigators
- Formal Educators (middle & high school, college intro)
- Science Centers
- Science-Interested General Public
LSST Education and Public Outreach Deliverables

**Audience**

- Citizen Science Principal Investigators
- Formal Educators (middle & high school, college intro)
- Science Centers
- Science-Interested General Public

**Deliverables**

- Infrastructure to initiate CS projects through the LSST Science Platform
- A suite of online investigations available through the Education Hub
- Multimedia assets in universal (Data2Dome) format
- Operations website in Spanish and English

- Promotion of CS projects on the LSST website
- Educator support materials
- Alert Stream highlights
- Science news highlights via traditional and social media

- PI support materials
- Professional development
- Interactive visualization tools
Finalized Citizen Science Phase 1 development

- Set up workflow for PIs to initiate citizen science projects from the LSST Science Platform using any LSST data
  - This process accounts for Data Rights and Access
- Zooniverse Project Builder platform ready to receive data directly from LSST Science Platform.
- Developed Spanish-language capability for citizen science projects within Zooniverse Project Builder (more generally, any language is possible now)
Input the basic information about your project, and set up its home page.

**Avatar**

Pick a logo to represent your project. To add an image, either drag and drop or click to open your file viewer. For best results, use a square image of not more than 50 KB.

**Background image**

This image will be the background for all of your project pages, including your project's front page. To add an image, either drag and drop or left-click to open your file viewer. For best results, use good quality images no more than 256 KB.

**Volunteers can choose which workflow they work on**

If you have multiple workflows, check this to let volunteers select which workflow they want to work on; otherwise, they'll be served randomly.

**NAME**

**LSST Science Rocks**

The project name is the first thing people will see about the project, and it will show up in the project URL. Try to keep it short and sweet. Your project's URL is /projects/lsstscience/lsst-science-rocks

**DESCRIPTION**

**Classify ALL THE THINGS**

This should be a one-line call to action for your project that displays on your landing page. Some volunteers will decide whether to try your project based on reading this, so try to write short text that will make people actively want to join your project. 277 of 300 characters remaining.

**INTRODUCTION**

So much data....

Add a brief introduction to get people interested in your project. This will display on your landing page. 1484 of 1500 characters remaining.

**WORKFLOW DESCRIPTION**

Add text here when you have multiple workflows and want to help your volunteers decide which one they should do. 300 of 500 characters remaining.

**RESEARCHER QUOTE**

Choose a Researcher

This text will appear on a project landing page alongside an avatar of the selected researcher. 255 of 255 characters remaining.

**ANNOUNCEMENT BANNER**


Finalized Citizen Science Phase 1 development

- Set up workflow for PIs to initiate citizen science projects from the LSST Science Platform using any LSST data
  - This process accounts for Data Rights and Access
- Zooniverse Project Builder platform ready to receive data directly from LSST Science Platform.
- Developed Spanish-language capability for citizen science projects within Zooniverse Project Builder (more generally, any language is possible now)

Phase 2 begins FY21

- Implementing package in LSST Science Platform
- Developing templates for LSST-approved Citizen Science Projects
- Organize a Citizen Science Data Policy Committee, likely to be a subset of the LSST Data Policy Committee, to review and approve metadata that can be kept (or not) from the proposed CS data sets.

Commissioning of two CS projects beginning FY22/23
Achievements - Multimedia

• Completed 16 short videos in planetarium format
  • 60-120 seconds
  • Available now for use as part of our user testing
    • Email abauer@lsst.org

ASK: need scientists to review planetarium videos and supplementary document for fact-checking
Achievements - Multimedia

• Completed 16 short videos in planetarium format
  • 60-120 seconds
  • Available now for use as part of our user testing
    • Email abauer@lsst.org
• Nearly complete LSST Promo Video (120 sec)
• Over 6000 multimedia assets uploaded to digital asset management system
• Storytime Domain interviews collected at PCW2018
  • Assembled into video for PCW2019
• Completed initial prototype for online 360° virtual tour of facility

ASK: need scientists to review planetarium videos and supplementary document for fact-checking
Formal Education – Focus of 2019

First Spanish-language user testing at Chile summer school
Educational investigations: screenshots
Teacher-Friendly
Developed and tested by educators
Designed for use with Next Generation Science Standards (NGSS)
Options for differentiated assignments and assessment
Ready-to-use or fully customizable versions
Minimal prep time
Comprehensive support tools

Engaging for students
Authentic data from a leading-edge telescope survey
Minimal learning curve for interactive tools
Visually appealing data sets
English and Spanish versions available
Appropriate for student-directed inquiry

Low stress technology
Accessed via a web page
No special software or data downloading required
Data exploration tools minimize tedious tasks
Totally free
SCIENCE THEMES

- **Solar System**
  - Surveying the Solar System
  - Hazardous Asteroids

- **Galaxies**
  - Mapping the Milky Way

- **Cosmology**
  - The Expanding Universe
  - Exploring the Observable Universe

- **Stars**
  - A Window to the Stars

- **Light**
  - Coloring the Universe

- **Dynamic Universe**
  - Exploding Stars
  - Leavitt’s Law

**Formal Education Timeline**
- NOW - Development
- 2020 - User testing
- 2021 - Professional development begins
- 2022 - Investigations ready to use
<table>
<thead>
<tr>
<th>Education Investigation Title</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coloring the Universe</td>
<td>Students construct a color image from LSST’s filters and gain intuition for wavelength-dependent properties of a variety of astronomical objects.</td>
</tr>
<tr>
<td>A Window to the Stars</td>
<td>Students gain understanding of the Sun and other stars using an H-R Diagram.</td>
</tr>
<tr>
<td>Mapping the Milky Way</td>
<td>Students explore density maps to determine what type of galaxy the Milky Way is, and where we are located within it.</td>
</tr>
<tr>
<td>Expanding Universe</td>
<td>Students construct Hubble plots to evaluate the expansion and acceleration of the Universe over time.</td>
</tr>
<tr>
<td>Exploding Stars</td>
<td>Students use light curves to determine the type of supernova, the progenitor star, and to calculate the distance to a galaxy.</td>
</tr>
<tr>
<td>Surveying the Solar System</td>
<td>Students make observations of newly-discovered solar system objects using an orbit visualizer to determine the object type.</td>
</tr>
<tr>
<td>Variable Stars</td>
<td>Students use light curves to learn about how stars vary with time (color, luminosity, stellar evolution), and use the information to calculate the distance to a galaxy.</td>
</tr>
<tr>
<td>Hazardous Asteroids</td>
<td>Students evaluate the potential threat of an Earth impact by making repeated observations of a newly-discovered Near-Earth Object.</td>
</tr>
<tr>
<td>Exploring the Observable Universe</td>
<td>Students explore large-scale structure using photometric redshifts and galaxy density maps.</td>
</tr>
<tr>
<td>Education Investigation Title</td>
<td>(pre-LSST) Data Needs</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Coloring the Universe</td>
<td>DONE!</td>
</tr>
<tr>
<td>A Window to the Stars</td>
<td>Need help in identifying the white dwarfs in our star cluster data and in calculating the luminosities/temperatures to place them on the HR diagram.</td>
</tr>
<tr>
<td>Mapping the Milky Way</td>
<td>DONE!</td>
</tr>
<tr>
<td>Expanding Universe</td>
<td>data of Type Ia SNe and host galaxies – need distance measurements and redshifts/velocities for large sample to construct Hubble diagram</td>
</tr>
<tr>
<td>Exploding Stars</td>
<td>data of Type Ia and Type IIp SNe with images along light curve, including near peak</td>
</tr>
<tr>
<td>Surveying the Solar System</td>
<td>Comet orbital information is reported in ways differing from the asteroids. Need help/advice in calculating orbits as a function in time in Cartesian ((x,y,z)) space, including starting positions.</td>
</tr>
<tr>
<td>Variable Stars</td>
<td>TBD</td>
</tr>
<tr>
<td>Hazardous Asteroids</td>
<td>Need uncertainties in the orbital parameters (not in MPC – in MOPS?)</td>
</tr>
<tr>
<td>Exploring the Observable Universe</td>
<td>Need redshifts from large, deep survey. Need a way to visualize the cube of ((RA,Dec,z))</td>
</tr>
</tbody>
</table>

**ASK:** need scientists to assist with gathering data listed above from existing datasets
Science Community Involvement during Construction

• We need scientists to work with EPO astronomer Lauren Corlies to assist with gathering precursor data for educational investigations
• We need scientists to review planetarium videos and supplementary document for fact-checking
• We will offer small grants for astronomers (likely ECRs) to do help setting up pipelines for data-related tasks
  • We will offer a stipend and travel to attend one LSST PCW to report on work
  • Look for announcement at time of PCW in August

I will send around email to this group by end of this week with specific requests and links so you can advertise in your collaborations
Upcoming EPO work

- Operations website architecture
- Branding work
- Developing Ops Communications Strategy
  - Defining process for a scientist to reach out with interesting science results
- Bringing the Alert Stream to the public
  - Join us at PCW2019 for a brainstorming session – we’d love your ideas!
- Formal Education investigation user testing
<table>
<thead>
<tr>
<th>Session</th>
<th>Leader</th>
<th>Day/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engaging Students with LSST Data</td>
<td>Ardis Herrold</td>
<td>Tuesday 11 am</td>
</tr>
<tr>
<td>Make Friends and Get Your Work Done</td>
<td>Amanda Bauer</td>
<td>Tuesday 3:30 pm</td>
</tr>
<tr>
<td>Bringing the Alert Stream to the Public</td>
<td>Lauren Corlies</td>
<td>Wednesday 1:30 pm</td>
</tr>
<tr>
<td>Lightning Stories</td>
<td>8 Project Members</td>
<td>Wed &amp; Thurs Plenaries</td>
</tr>
</tbody>
</table>

Look for the video produced from *StoryTime Domain* 2018 sessions
EPO is Hiring!
Please spread the word.

Web Developer: http://ls.st/6oc

Designer: Ad out v soon.

LSST Education and Public Outreach
www.lsst.org/about/epo  education@lsst.org

youtube.com/lsstteam
facebook.com/mylsst
instagram.com/lsst_astronomy
twitter.com/lsst
Thank You!

Dr Amanda Bauer

abauer@lsst.org
@astropixie

LSST Construction March 2019
Formal Education
Online, data-driven investigations for students in advanced middle school through college, teacher support materials, and professional development opportunities.

Citizen Science
Support for researchers to create citizen science projects using LSST data, including a project-building tool on the Zooniverse platform.

General Public
Online opportunities for a diverse audience to interact with and explore LSST data. News about discoveries, and profiles of LSST scientists and engineers and their work.

Science Centers & Planetariums
An easy-to-use gallery of high-quality multimedia assets that can be downloaded and integrated into exhibits and presentations.