A brief introduction to Public Engagement with Astronomy

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Oldest University Observatory in the World.

Two broad research clusters:

- Galaxies and the structures in which they are embedded
- Exoplanets, star and planet formation
Education Programmes

PhD programme

2-year MSc programme
- English
- 7 specialisations including Science Communication
- Office space: Desk + computer
- More info: mastersinleiden.nl

3-year BSc programme
Is this science communication?
What is for you science communication?
A: Curriculum-driven
B: Educational programmes
C: Museum exhibits, star parties, …
D: Planetariums shows, IMAX movies, public talks, …
E: TV/radio documentaries, podcasts, blogs, social media magazine articles
F & G: Press releases, press conferences, press kits, Video News Releases, media interviews, media courses for scientists …
H: Exhibition booths, annual reports
I: Merchandise
Science Communication “Skills”
# Development of Science Communication

<table>
<thead>
<tr>
<th>Science Literacy</th>
<th>Public Understanding of Science</th>
<th>Public Engagement with Science</th>
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</table>
| • Deficit of knowledge  
| • Communication from scientists to public  
| • One-way communication  
| • Public is informed | • Similar to scientific literacy  
| | • Focus on the understanding of the scientific enterprise, including the processes and uncertainties  
| | • Still one-way communication | • Dialogue between the public and the scientists.  
| | | • Public engaged in scientific reasoning  
| | | • Public engages in practical aspects of science  
| | • Public are simple receivers of knowledge without a say in the process.  
| | • Scientific knowledge lies with the scientific elite of professional scientists | • seen as a way to control and manage public opinion |
Isle educators prepare for the International Year of Astronomy

2009 celebration to honor 400 years of seeking answers in the sky

Forty-one educators from across the Big Island attended the recent International Year of Astronomy Teacher's Workshop, the first such program to be held in Hawaii. The workshop was part of the worldwide celebration leading up to the 2009 International Year of Astronomy, honoring 400 years of the telescope’s advancement of astronomy. The workshop was sponsored by Gemini Observatory, TMT (Thirty Meter Telescope), Big Island Toyota and the NELHA (Natural Energy Lab) at Keahole, which hosted the event.

For information regarding future Hawaii Island educator workshops, contact Janice Harvey at j.harvey@gemini.edu. "The Universe, Yours to Discover," is the theme of the event.

Our galaxy and we are moving towards an understanding of how life might have first appeared. "One hundred years ago we studied the sky using only optical telescopes and photographic plates. Today we observe the Universe from Earth and from space, from radio waves to gamma rays, using cutting edge technology. Media and public interest in astronomy have never been higher and major discoveries are front-page news throughout the world. The IYA 2009 will meet public astronomical experiences as we all celebrate the International Year of Astronomy 2009," said Cesarsky.

The vision of IYA 2009 coordinators is to help the citizens of the world "rediscover their place in the Universe through the day- and night-time sky, and thereby engage a personal sense of wonder and discovery. All humans should realize the impact of astronomy and basic sciences on our daily lives, and understand better how scientific knowledge can contribute to a more equitable and peaceful society."

It will be a global celebration of astronomy and its contributions to society and culture, highlighted by the 400th anniversary of Galileo.

"We want to promote widespread access to the universal knowledge of fundamental science through the excitement of astronomy and sky-observing experiences," said coordinators.

Locally, and globally, project promoters want to enable as many lay people as possible, especially children, to look at the sky through a telescope and learn about the universe as it has been described by humanity throughout history while enjoying the experience of learning about space exploration. "In 1492, Galileo Galilei first used a telescope to observe the moon and the other planets of our solar system," said coordinators.
(e)Books/apps about astronomy.
Open House Days.
Talks in local astronomy clubs, science centres, schools, planetariums, cultural centres and astrocafés.
Hurricane Isaac menaces the Gulf coast

Hurricane Isaac is hitting the Gulf coast of the US right now, battering the area with 120 kph winds. Just after local midnight on August 28, the Suomi NPP Earth-observing satellite took this eerie and beautiful picture of Isaac when it was still a growing tropical storm:

New Media (blogs, twitter, FB)
Astronomy themed activities in schools.
Observing Nights
Planetarium Shows
Work experience for high school and undergrad students in your institution.
How managers can contribute to IYA2009

• Encourage work experience placements for science students.
• Encourage “artists in residence” programme in the organisations or institutions.

“artists in residence” programmes in astronomical organisations or institutions.
Innovative art/science project
Music Concerts
Astronomy Exhibitions
Public Talks
Very creative approaches
Dinner inside a Planetarium
Camping inside a Planetarium
Clubbing inside a Planetarium
Finding Nemo
ambition
from science to science fiction
Ambition: Movie Project

Pre-Production
- Concept
- Script
- Storyboard

Production
- Final storyboard
- Casting
- Shooting
- VFX

Post-production
- Comm campaign
- Teaser
- Premiere
- Follow-up

October 2013 - February 2014 - September 2014
Starting Points for Ambition

• Rosetta is an exciting (science) mission

• Use the power of pop culture and social networks to reach audiences beyond the typical space enthusiasts. (Main hook: famous actor/actress)

• Create a buzz/hype around the project to reach the untapped audiences
The probes float towards him. The Master “wipes the board clean” with a gesture.
A shot from above – we see what the Apprentice has painstakingly constructed. A geometrical river delta cuts through a wasteland surrounded by rubble. The Master rapidly wipes the terrain clean with a seismic wave that spreads out in a hexagonal form.
On the empty “canvas” of the landscape, the Master constructs the setting for his story. The rubble on the horizon turns into the Kuiper belt. Blocks representing the planets appear in the wasteland. The blocks move in “orbits” around the center of the wasteland. Master and Apprentice walk past the symbolic Earth.

MASTER
What was the basis of life on Earth?
The Apprentice shrugs her shoulders. The answer is obvious.

APPRENTICE
Water.

MASTER
In the 21st century, the origin of water and life on earth were still a mystery. People began to search for the answer beyond Earth, and even beyond the Solar System.
Storyboard
Science Consultancy in a Science Fiction Movie

Science has to be accurate enough to serve the story and to convince the viewer that what’s going on in the movie could actually happen.
### Science Visuals Storyboard

**Ambition: Scientific Storyboard**  
Based on Ambition Shooting Board version 1.0  
ver 1.1 - 25 June 2014

<table>
<thead>
<tr>
<th>Scene #</th>
<th>Scientific Accuracy</th>
<th>Visuals</th>
<th>Science and Tech Assets</th>
</tr>
</thead>
</table>
| 25, 26  | Planet relative sizes, distances, rotation and translation speeds  
         | Planets' feelings | See planet "moodboard" for real images of the planets | Textures  
         | Calculate sizes and speeds (Based on: [https://docs.google.com/spreadsheet/ccc?key=0Apv5UJfJo05FjNdPwNhxFWGNMm5KQ1VXgG1QZHFQcn&usp=drive_web#gid=0](https://docs.google.com/spreadsheet/ccc?key=0Apv5UJfJo05FjNdPwNhxFWGNMm5KQ1VXgG1QZHFQcn&usp=drive_web#gid=0)) |
| 28      | Kuiper Belt's density | General look for kuiper's belt objects | |
| 29-30   | kuiper belt object becomes comet. show process | collision. object is slingshot to inner solar system | |
| 31      | interaction with jupiter | Jupiter look & textures. | |
| 32-33   | comet look | Comet look & textures | |
| 36      | Mars | Mars I | |
| 38-40   | rosetta orbit. Slingshot | Comet and spacecraft orbit data | We have (for “where is rosetta”) all the orbital description and planets positions |
Science Visuals Storyboard
Science Visuals Storyboard
Master
  - So what didn't work, then?

Apprentice
  - I don't know. I planned... everything.

Master
  - Are you giving up?

The Apprentice shoves her hands into her pockets, slumping her shoulders even further.
Suddenly the probe appears over the characters. Above it, the comet emerges from the darkness in a blaze of light. We watch the probe chase the comet (but it is the comet that approaches the characters). We see the complicated procedure of orbiting around the comet.

The objects are close to each other in front of the characters.

**Master**
- Everything came down to that moment.
Cast

- European cast (actress + actor) with international profile.

- Cast of Game of Thrones:
  - Little finger: Irish actor: Aidan Gillen
Shooting
VFX - Visual Effects
Teaser

AMBITION Official Teaser Trailer

Video statistics

- Views: 387,048
- Time Watched: 286 days
- Subscriptions Driven: 346
- Shares: 652

Cumulative | Daily
Ambition is the new sci-fi film I didn't even know I wanted to see
Premiered on 24 October in London at BFI’s (British Film Institute) major UK-wide celebration of Sci-Fi Days of Fear and Wonder
Results.

Ambition YouTube: 992 199
ESA YouTube: 1 419 941
ESA website: 226 430

Total viewers: ~2.6 M viewers
Content Analysis of On-line Comments

Opinion and attitudes towards this science communication approach and the mission itself.
Content Analysis of On-line Comments

Temporal Sentiment Analysis of Ambition the Film (K. Borner, P. Russo. et al. 2016, submitted)
"I am surprised that we need something like this at all now. Mankind sends a probe into space to catch a comet and land on it, and we need a great director, film and actors to convince people that this is interesting."

Lukasz Sobisz, Platige Image
Case Study
Impact on Astronomical Research

Policy Issue: Spherical aberration mocked by media (and they public).

Reaction: Large scale outreach campaign by NASA/STScI.

Result: Changed public perception/opinion.

**Policy Issue:** Servicing mission 4 cancelled by NASA administration (O’Keefe).

**Reaction:** Grassroots campaign by “Hubble Huggers” established a direct dialogue between NASA and public.

**Result:** Servicing mission reinstated for 2009 by NASA administration (Griffin).

**Policy Issue:** Funding cancelled by US House of Representatives.

**Reaction:** Grassroots campaign #saveJWST by “Science Warriors”.

**Result:** Funding reinstated.


**Reaction:** Reboot Team fights to save probe, launches crowdfunding campaign, raises $160,000.

**Result:** Probe given to Reboot Team and citizen scientists.
Crowdfunding Space

- Rewards-based: backer receives perks for donating
- Numerous reasons to crowd-fund:
  - funding, exposure
  - outreach, effort to include the public
- But: some space-related projects cost significantly more than what would be feasible to crowd-fund
People-Powered Research

The Zooniverse provides opportunities for people around the world to contribute to real discoveries in fields ranging from astronomy to zoology. Welcome to the largest online platform for collaborative volunteer research.

Get involved now!
Few have witnessed what you're about to see
Experience a privileged glimpse of the distant universe as observed by the SDSS, the Hubble Space Telescope, and UKIRT

Classify Galaxies
To understand how galaxies formed we need your help to classify them according to their shapes. If you're quick, you may even be the first person to see the galaxies you're asked to classify.

Begin Classifying

How Do Galaxies Form?
Roughly one hundred billion galaxies are scattered throughout our observable Universe, each a glorious system that might contain billions of stars. Many are

History of Galaxy Zoo
The launch of this new version of Galaxy Zoo, the 4th, comes just a few weeks after the site’s 5th birthday. It all started back in July 2007, with a data set made up of a million
Research Cycle

1. Obtain Funding
2. Conduct Experiments
3. Communicate Results
4. Build Reputation

The cycle is continuous, moving from Obtain Funding to Conduct Experiments to Communicate Results to Build Reputation, and back to Obtain Funding.
Research Cycle 2.0

- Obtain Funding
- Build Reputation
- Conduct Experiments
- Communicate Results

Logos:
- NASA
- Kickstarter
- SETI Home
- Galaxy Zoo
- YouTube
- Twitter
A fascination for science should not be confined to scientists themselves. Appropriate communication about science and technology will keep the general public in touch with the field and abreast of developments. Everyone, young and old, will be well-informed and enthusiastic about all aspects of science and technology. **Science must be visible.**
Workshop

Part II: Design a Public Engagement Activity, Project or Initiative
How Planetary Sciences can support Public Understanding of Climate Change?
Phase I: Exploration

Groups of 5 students

20 min

Look for inspiration.

Create a mindmap around the topic: “Planetary Sciences & Climate Change"
MIND MAPPING

BENEFITS
- Overview
- Easy to memorize
- Simple, fast & fun

PLANNING
- Projects
- Goals
- Strategies

CREATIVITY
- Ideas
- Innovation
- Thoughts

COLLABORATION
- Teamwork
- Sharing
- Colleagues

PRODUCTIVITY
- More efficient
- Intuitive
Phase II: Ideation

30 min.

Based on your exploration suggest 1 project or initiative or activity to address the central topic.

3 slides that need to include:
- Title + Your names
- Mind map
- Target Audience (for Whom?)
- Type of project (What is this project?)
- Objectives (Why is it important?)
- Implementation (How are you doing it?)
- Evaluation (How to know if it worked?)

Send slides to russo@strw.leidenuniv.nl
Thank you to all my collaborators and co-authors.
Relevant Websites

- **International Year of Astronomy 2009**: www.astronomy2009.org
- **Universe Awareness**: www.unawe.org
- **IAU astroEDU**: www.iau.org/astroEDU/
- **Space Awareness**: www.space-awareness.org
- **TEMI**: www.teachingmysteries.eu
- **Open Science Centre**: www.opensciencecentre.org