

# SpaceGAMBIT Project Proposal

## 1. Project Title

Asteroid Hackathon

(code name: S.P.E.A.R., or **S**ave **P**lanet **E**arth **A**steroid **R**esearch)

## 2. Primary Contact

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## 3. Project Summary

Asteroids represent a real threat to humankind, and organizations like the Minor Planet Center (MPC), NASA, Pan-STARRS, Catalina Sky Survey, and the International Astronomical Union (IAU) are doing a great job of gathering and parsing data (observational/positional and characterization) in order to keep us all safe. That said, there is a dearth of engagement from the non-scientific, non-professional astronomy community, the “citizen scientists”, if you will. There is considerable opportunity in empowering citizen scientists and amateur astronomers to access and manipulate MPC's asteroid dataset to find new insight into data patterns, generate additional observations and characterization, and ask questions that we don't otherwise know to ask presently. However, one of the greatest obstacles today is making the asteroid data approachable and compelling: both from a technical/backend point of view, as well as a user experience (UX) perspective. Thus we present the Asteroid Hackathon.

The hackathon we propose involves recruiting idea submissions from (maximum 3-person) teams with a mix of User Experience (UX), software engineering and astronomy/science backgrounds, and letting them explore their proposals in a traditional hackathon format. We will spread awareness and participation in the Asteroid Hackathon through our existing technical communities, PR partners, and social platforms (as we

have in holding other hackathons previously; e.g., wearables design hackathon). Winners will be adjudicated by a panel of trusted industry experts, and winners will receive a monetary prize, as well as in-kind support from the broader “asteroid hacker” community.

#### **4. Relevance to SpaceGAMBIT Mission**

Makers come in all shapes and sizes, and we believe teams competing in the Asteroid Hackathon would embody the essence of the maker ethos. In particular, we believe that by encouraging multi-disciplinary teams to realize the untapped potential, the resulting data mashups will serve to complement existing MPC and industry work. Further, we see the subject matter - making the asteroid data we have today more visible and usable - as dovetailing nicely with NASA's Asteroid Grand Challenge.

Finally, by looking outside of the traditional asteroid “scientific establishment”, if you will, we hope to come away with new perspectives on the challenges we face - in addition to unique solutions as to where we can go from here.

#### **5. Project Description**

As noted earlier, we plan on creating, coordinating, nurturing and adjudicating a maker hackathon, with the twin goals of creating awareness and encouraging engagement with the “citizen scientist” community around asteroid data challenges and opportunities. Hackathons are historically very useful in quickly generating non-traditional solutions to entrenched problems. In our case, the problem space is threefold:

1. **Awareness problem:** lack of awareness from the non-scientific community as to the *availability* of asteroid data
2. **Engagement problem:** lack of engagement from the non-scientific community with this data (due to technical limitations of the data as well as its high technical proficiency threshold)
3. **Solution problem:** lack of compelling solutions and mashups of data sources (MPC and non-MPC) and technologies to foster Awareness and Engagement

##### *Challenge statement*

“Help save our planet by tackling asteroid data and making it digestible for the broader community. Explore new frontiers of data mashups and UI

visualizations, so that citizen scientists far and wide can support the MPC's mission to further the "identification, designation and orbit computation" of asteroid and near earth objects."

The above statement frames the problem set at a high level, and will act as the guiding statement for hackathon entrants and adjudicators.

#### *Challenge focus areas*

Asteroid data is necessarily complex, and the MPC and other entities are doing a great job at managing this complexity. However, there are clear areas that could use more attention than others, and these can serve as rough guidelines for hackathon teams as they think about tackling asteroid data. Clearly, finding and identifying asteroids is at the core of the MPC's mission. However, there are other tasks that require equally as much data analysis and verification that asteroid hackers could tackle:

- **Asteroid characterization.** Looking at light curve analysis from amateurs contributes to the existing data held by the MPC and gives scientists a better understanding of the shape and rotational spin of Near Earth Objects & Asteroids. Based on this and other Sky Survey observational data, this data contributes to the characteristics of the NEAs that we know about.
- **Data quality.** A common problem for asteroid data crunchers is ensuring data quality (both from official sources as well as the broader citizen scientist community), and conducting follow up observations and verifications to increase data accuracy.
- **Data types.** Asteroid data comes in many formats, with different insights derived from each. Asteroid hackers are encouraged to mash up these sources and garner new insights. Examples of data types include:
  - *Infrared data:* used to calculate size
  - *Radar/Lidar data:* used to calculate position and size
  - *Spectral data:* color is used to indicate asteroid composition
  - *Spin data:* spectral data can be combined with temporal data to calculate spin rate
- **Data access/visualization tools.** Data is only interesting in the ways it can be manipulated and understood. Citizen scientists, as well as the broader common technology user, are motivated by easy to use tools and neat visualizations. Asteroid hackers are encouraged

to design and demonstrate development of tools to engage the wider asteroid citizen scientist audience.

- **Community.** While there are many avid, qualified amateur astronomers worldwide who could help crunch and interpret asteroid data, the expert knowledge remains in the hands of the few. As such, we also encourage hackers to think of ways to encourage sustained asteroid hacker engagement and discussion in the long term, as well as attract new generations of hackers to the problem space.

#### *MPC and asteroid data: hard to access*

The nature of asteroid data exacerbates the 3 problems stated above. Firstly, it is often in non-engineering-friendly formats (flat files, non-traditional database configurations, fragmented API structures, etc.), which makes it hard to engage with, and of course leads to fewer generated solutions as a result. Second, given that the data itself isn't popular with engineers, it means that non-engineers (citizen scientists) and the like are disinclined - or even wholly unable - to access to the data in order to glean insights. As such, making sure a UX designer works in concert with a software engineer on each hackathon team will go a long way to making sure that the data is output to a usable and intuitive format.

## **6. Methods and Implementation Plan**

### **a. Objectives**

- + Align unique teams of astronomers, UX designers and software engineers, specifically focused on 'hacking' the data provided by the Minor Planet Center
- + Leverage the expertise of multidisciplinary teams to think about and engage on the Asteroid Grand Challenge to creatively engage on developing ideas on how to use, visualize, query and display the MPC's data
- + Inspire more amateurs and developers to engage in the Asteroid Grand Challenge, whether it is from a design perspective, hacking, making, or working with or contributing to the MPC data.

+ Creating more awareness about the Asteroid problem for citizens, and more accessible and engaging data for 'citizen scientists' to explore and experiment with new solutions.

## **b. Tasks**

### JUNE

- June 1 - Announce hackathon event & call for teams, concepts.
  - Bateman PR and NASA Media Channels.
- June - Recruit teams and Hackathon PR (All of June).
- June 17-20 - Asteroid Grand Challenge Anniversary.
  - Virtual charrette (aka, enquiry by design), introduce challenge and hack.

### JULY

- July 1 - "Turn on" access to data July 1. By way of submitting your team members and team name to us.
- July 15 - Submit draft ideas.
- July 21 - Invite teams to NASA Ames. Looking for 10-15 teams.

### AUGUST

- 2-day Hackathon Weekend.

### SEPTEMBER

- Sept 10th - -Reporting Deadline

## **c. Time allocation**

### Planning & Logistics

- Define the Challenge
- Define Success
- Timeline
- Process
- Event Venue

### Hack Design and PR

- Outreach

- Create web presence (on SpaceGambit.org and/or elsewhere)
- Call for Team Designs
- Selection of participant teams

### Challenge Days

- **Sat/Sun**
- Day 1
  - Morning 1 - Check-in. NASA Ames tour.
  - Afternoon/Evening 1 - Keynote speech/introduction. Rapid fire idea presentation (4 min; strict). Breakout private feedback by UX/dev organizers. Reception.
- Day 2
  - Morning - 4-hr working “hacking” session in provided workspaces, with supplies, at Ames.
  - Day 2 post lunch - Guest speaker.
  - Day 2 afternoon - final presentations.
  - Day 2 late afternoon - awards. \$\$\$

### Reporting

- Synthesize notes, photos, video, etc.
- Prepare online announcements via blogs and social media.

### **d. Milestones and Deadlines**

June 1 - Announce hackathon event.

June - Recruit teams. PR.

June 18 - virtual charrette for Grand Challenge anniversary. Introduce Challenge.

July 1 “Turn on” access to data July 1. By way of submitting your team members and team name to us.

July 15 - Submit draft ideas.

July 21 - Invite teams to NASA Ames. Looking for 10-15 teams

Aug 1ish - 2-day Hackathon Weekend.

Sept 10th - -Reporting Deadline

## **7. Team, Hosting and Partner Organizations**

The hackathon team is comprised of an eclectic group of designers, innovators, scientists, geeks and makers.

### **José Luis Galache** | Minor Planet Center

José Luis is our lead astronomer from the IAU's Minor Planet Center, helping us devise the parameters and technical needs of the asteroid data that he works with on a daily basis. José Luis studied physics at the Universidad Complutense de Madrid, Spain. He continued with an MPhys in Nuclear Astrophysics at the University of Surrey, UK and a PhD in Astronomy at the University of Southampton, UK. He joined the MPC in 2009 and spends his days thinking up ways to make the MPC compliant with the 21st century while juggling a research interest in Near-Earth Objects, especially those that might be reachable by a human mission. He would be available for said mission should he be asked (back seat of the rocket is fine).

### **Mick McGee** | EchoUser

Mick is president and co-founder of EchoUser. He is driven to improve human experience wherever possible. Before EchoUser Mick worked for 15 years advancing user testing and design methods, creating UI Standards, and defining corporate usability benchmarking processes. He is expanding his philosophy at EchoUser to innovate experiences for users and customers, whoever they may be and whatever they may be doing. Mick and EchoUser have helped organize hackathons in the past, most recently with a Wearables Design Jam in collaboration with Oracle. This includes PR, accounting, and other behind the scenes support to ensure success.

### **Etan Lightstone** | New Relic

Etan is Director of User Experience at New Relic, one of the foremost application monitoring and analytics companies, overseeing a team of talented designers, leading the user experience design strategy, and on occasion getting the opportunity to contribute to the product codebase. Before New Relic, Etan was a senior user experience engineer at

EchoUser, where he worked on dozens of user experience and usability projects for many Fortune 500 companies. Etan has a hybrid background of software engineering and UI design, with special interest in data visualization and analysis, as well as surfing, guitar, and photography.

### **Felix Desroches** | Google

Felix is currently a designer at Google, working on the future of AdWords. He's been a designer and surfer since he landed in San Francisco 7+ years ago. While at FURTHER by Design, he worked with inspiring people at Goodwill, USAID, State Department, NASA and TechSoup (among others) as they changed the world. He also co-created LAUNCH, an investment innovation program with NASA that is now in its 4th year. After that he spent 3 years with EchoUser, a San Francisco design firm dedicated to bringing great UX to everyone, where he focused on enterprise product redesigns and startups. Finally, from 2012-2013 he spent 11 months on sabbatical in his surf van, reconnecting with what it means to be free.

### **Jeff Hamaoui** | FURTHER by Design

Jeff is an expert in collaborative innovation and is fascinated with open innovation, systems collaborations and the intersection between the two. Jeff has spent 20 years building partnerships around the world working with many fortune 500 companies, governments, investors and NGO's trying to understand the strategies, technologies, financial tools and narratives to effectively get groups of people to design together, invest together and work together. It's been an interesting ride so far. Jeff is also co-Founder of LAUNCH, a global sustainability innovations program supported by NASA, USAID, Department of State and NIKE and sits on a number of boards focusing on access to technology (the very awesome Techsoup Global), education and youth development. Jeff is currently designing and delivering the systems innovation and design course at the Wharton School of Business in Philadelphia. He also loves to surf.

### **Blair Tom** | FURTHER by Design

Blair is a creative chameleon; distinct and unique. He has spent much of his life chasing his passions and helping others chase theirs as well. With much experience he has developed the tools to lead groups through the jungle to a surf break, manage grassroots community farms and restaurants, run the gauntlet of the retail world, teach classes from Kindergarten to College levels, build a house and furniture to go in it, or



perform desk research and analysis. Blair is an accomplished multi disciplinary artist with a BA in History and MA in History. He is a sophisticated writer and thinker in history, sociology, art, making, sustainability and culture.

### **SpaceShop** | NASA AMES Research Center

NASA AMES Research Center in Mountain View will host our UX/UI Challenge. We'll also look to incorporate some of the making and hacking from the Space Shop. While 'making' may not be as incorporated into this event as 'hacking' is, we do hope that it will be able to draw attention to the fact that there is a need and space to be engaging space, science and asteroids through making and hacking.

### **PR & Media** | Bateman Group

Bateman Group is an award-winning digital communications agency founded in 2004 to make a bigger impact for a more select group of companies. We integrate PR, social media, content marketing and analytics to help technology and consumer brands turn innovation into market leadership.

## **8. Budget**

\$5,000 - Prize money

\$5,000 - Promotion and PR engagement

\$5,000 - Facilities rental and hackathon supplies

\$5,000 - Labor expenses (non salaried)

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\$20,000 - Total

## **9. Project Deliverables**

### *Hackathon Expected Outcomes & Deliverables*

Every hackathon is different; it is simply the nature of the event that you never know exactly what will come out of the creative process. However, hackathons are always generative, and often help push the boundaries of what is possible while simultaneously reframing the problem set for future generations. We expect the hackathon to:

- **Generate awareness:** in the short term, the hackathon will certainly generate buzz and engagement from the entrants and interested community (especially with the support of our PR partners). However, in the longer run, the hope is to leverage this initial burst of activity to create a community that thrives and continues the conversation and data crunching long after the hackathon event is over.
- **Generate solutions for reuse:** we fully expect the teams to come up with new solutions and approaches to crunching asteroid data. Some might be more data/backend focused, some might be very visual and UI focused - but all will have a shelf life infinitely longer than the hackathon, and hopefully inform ongoing MPC and asteroid community endeavors for awhile to come.
- **Generate new questions:** finally, while awareness and solutions are great, it is often the creation of new questions that helps keep an industry evolving, pushing, and progressing. We want the asteroid hacker community to ask tough, unique questions, and keep doing so for the benefit of asteroid hunters everywhere.
- **Synthesis:** A full length synthesis of the Asteroid Hackathon accompanied by pictures and/or video that will describe the process, activities, engagement from the event. Accompanied with an evaluation of the successes and failures, along with an accounting of the budget expenditures, a blog and social media posts.