



JÓVENESCAI

# TECNOLOGÍA E INNOVACIÓN

Flut Mapper: app para mitigación de inundaciones; la importancia de aprovechar las oportunidades y cómo desarrollar una idea de valor en 48hs.



**ZONDA INC.**

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¿Quiénes somos?

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¿Qué es NASA Space Apps?

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¿Cuál fue nuestro proyecto?

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**¿Quiénes somos?**

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## El equipo



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**2**

**¿Qué es NASA Space Apps?**

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## NASA Space Apps



- Hackatón Internacional
- 2-4 de Octubre de 2020
- +26.000 personas de +150 países
- "Take action"
- 2300 proyectos de 3800 equipos

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## NASA Space Apps



NASA INTERNATIONAL SPACE APPS CHALLENGE 2020

OCTOBER 2-4, 2020 | [Spaceappschallenge.org](https://spaceappschallenge.org)



# TAKE ACTION FROM HOME

**26,165** REGISTERED PARTICIPANTS | **148** COUNTRIES/TERRITORIES | **3,831** TEAMS | **2,303** PROJECTS SUBMITTED

**251** LOCAL LEADS/LOCAL VIRTUAL EVENTS | **4,368** UNIVERSAL EVENT REGISTRATIONS | **159** SUBJECT-MATTER EXPERTS (SMES) | **32** SPACE APPS AMBASSADORS

**71M** SOCIAL MEDIA REACH | **23** CHALLENGES

### TOP 5 COUNTRIES BY NUMBER OF REGISTRATIONS

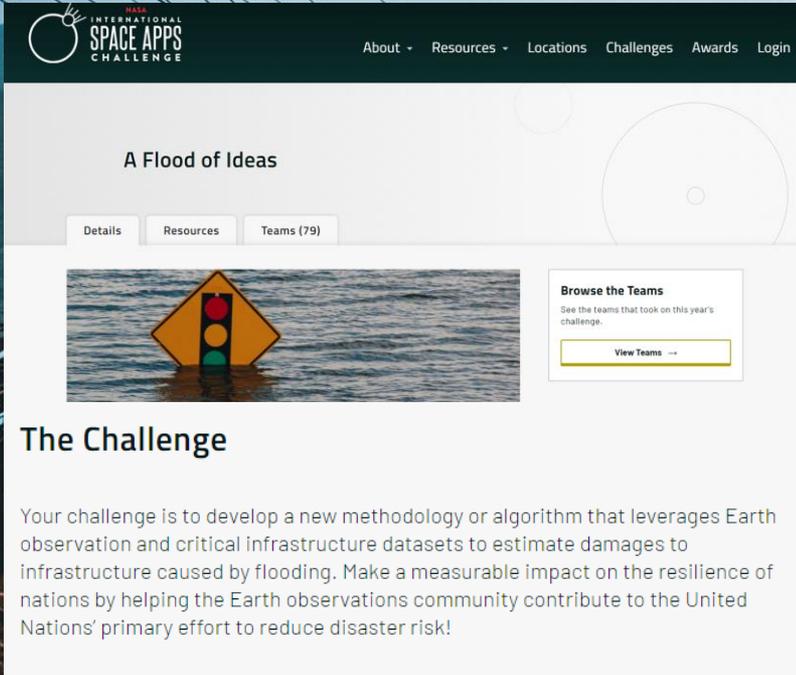
- ▶ INDIA
- ▶ BRAZIL
- ▶ EGYPT
- ▶ TURKEY
- ▶ USA

### COLLABORATORS GLOBAL

- ▶ AMAZON WEB SERVICES
- ▶ GODADDY REGISTRY
- ▶ GOOGLE
- ▶ IBM
- ▶ METEOMATICS
- ▶ MICROSOFT
- ▶ MIRO

### COLLABORATORS AMPLIFICATION

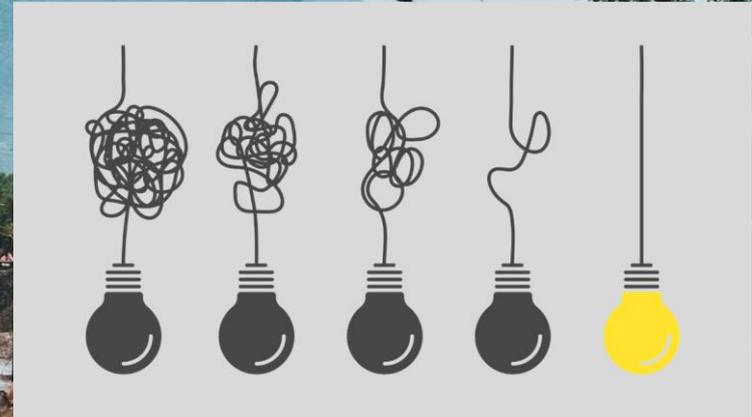
- ▶ AMERICAN FAMILY INSURANCE INSTITUTE FOR CORPORATE AND SOCIAL IMPACT
- ▶ ANITA B.ORG SYSTEMS
- ▶ BLACK GIRLS CODE
- ▶ CODING TEMPLE
- ▶ GEN SPACE
- ▶ SATELLITE APPLICATIONS CATAPULT
- ▶ WE R NATIVE



The screenshot shows the NASA International Space Apps Challenge website. The header includes the NASA logo and the text 'INTERNATIONAL SPACE APPS CHALLENGE'. Navigation links for 'About', 'Resources', 'Locations', 'Challenges', 'Awards', and 'Login' are visible. The main content area is titled 'A Flood of Ideas' and features tabs for 'Details', 'Resources', and 'Teams (79)'. A central image shows a traffic light on a small boat in floodwaters. To the right, a 'Browse the Teams' section includes a 'View Teams' button. Below the image, the 'The Challenge' section is displayed.

## The Challenge

Your challenge is to develop a new methodology or algorithm that leverages Earth observation and critical infrastructure datasets to estimate damages to infrastructure caused by flooding. Make a measurable impact on the resilience of nations by helping the Earth observations community contribute to the United Nations' primary effort to reduce disaster risk!



Imágenes Satelitales

Indicadores

Estimate damages to infrastructure caused by flooding

Discover new ways that Earth Observation can contribute to the monitoring and reporting of critical infrastructure impacts from flood events across the world

What links usefulness for monitoring capabilities to a lack of suitable analysis capabilities that could be implemented to sustain monitoring efforts around the world

The solution will contribute to a better national scale understanding of the impacts that could be implemented to sustain monitoring efforts around the world

GFMS: real time TRMM Multi-sate precipitation analysis (TMPA) Precipitation data input.

The latest map of instantaneous precipitation and totals from -1, -3 & -7 days

Streamflow, surface water storage, inundation variables are calculated at 1km resolution

Flood detection/intensity estimates are used on 13 years of retrospective model runs

200km<sup>2</sup> grid (50°N-50°S)

Páginas 54 y 92-108 del Technical Guidance

Develop a new methodology or algorithm that leverages Earth observation and critical infrastructure datasets to estimate damages to infrastructure caused by flooding. Measurable impact on the resilience of nations. Contribute to the United Nations' primary effort to reduce disaster risk!



Agentes involucrados: -Critical infrastructure -Protective infrastructures -Green infrastructure -Basic Services

Target D refers to two separate but interconnected situations. The first is the situation in which **critical infrastructure is damaged** (without services necessarily being disrupted or compromised in terms of quality) or **destroyed** and the second is when **basic services are disrupted** (which could potentially happen with or without damage).

No.	Indicador
D-1	Damage to critical infrastructure attributed to disasters. (compound indicator)
D-2	Number of destroyed or damaged health facilities attributed to disasters.
D-3	Number of destroyed or damaged educational facilities attributed to disasters.
D-4	Number of other destroyed or damaged critical infrastructure units and facilities attributed to disasters. The decision regarding those elements of critical infrastructure to be included in the calculation will be left to the Member States and described in the accompanying metadata. Protective infrastructure and green infrastructure should be included where relevant.
D-5	Number of disruptions to basic services attributed to disasters. (compound indicator)
D-6	Number of disruptions to educational services attributed to disasters.
D-7	Number of disruptions to health services attributed to disasters.
D-8	Number of disruptions to other basic services attributed to disasters. The decision regarding those elements of basic services to be included in the calculation will be left to the Member States and described in the accompanying metadata.

$C_5 = \text{Sum of direct economic loss estimated for } D_2, D_3, D_4$

Where:

- $D_2$  is number of destroyed or damaged health facilities attributed to disasters.
- $D_3$  is number of destroyed or damaged educational facilities attributed to disasters.
- $D_4$  is number of other destroyed or damaged critical infrastructure units and facilities attributed to disasters.

The secretariat methodology proposes to calculate the indexes as follows:

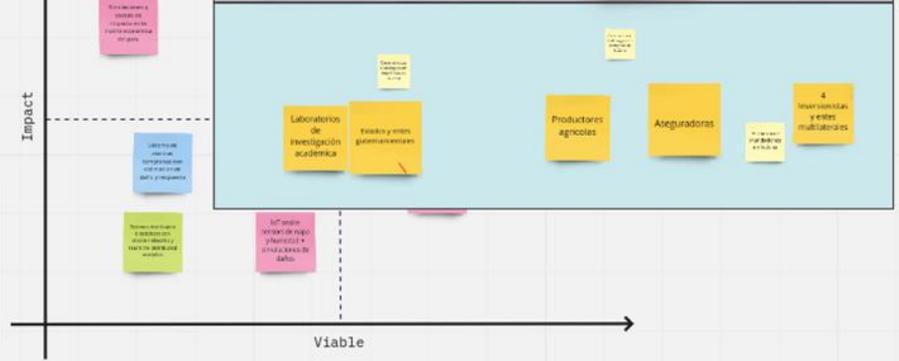
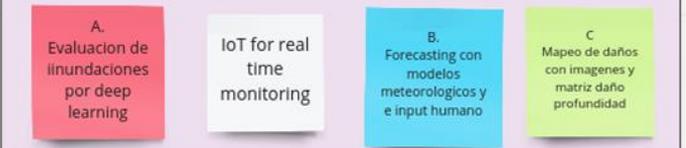
**D-1 = Index of Critical Infrastructure Damage =**  
 $\text{number of infrastructure units and facilities damaged} / \text{population} * 100,000$

**D-5 = Index of Service Disruptions =**  
 $\text{number of disruptions occurred} / \text{population} * 100,000$

The number of disruptions occurred and the number of units of facilities damaged is recommended to be collected and reported from national disaster loss databases. This method will separately sum, for all disasters, the number of schools, health and infrastructure units and facilities affected. Situations in which more than one school, health or other facilities were affected will contribute more to the sum.

[Desirable Disaggregation Requirements] (same as for C-5): Hazard Geography (Administrative unit) Level of affection (damaged/destroyed) Size of Facility (small/medium/large). If Member States wish to report more detailed losses by disaggregating by size and type of asset, they should use the Metadata mechanism specified in indicator C-5 to declare this disaggregation.

**FLUT MAPPER**  
 Nowadays floods cause loss of economic, physical and social assets, totaling millions of dollars and hundreds of lives worldwide. Therefore, we propose to develop a tool that could help societies to determine the recovery cost after a flood. By using satellite images, provided by the ESA Sentinel-1 Mission, this tool will set up a map of a specific region, paying special attention to the critical infrastructure locations, essential services facilities and topographic features. Finally, through real-time monitoring, the tool will be able to evaluate the scale of a flood and estimate the cost. Furthermore, the tool can be used to simulate future events and take decisions to reduce their impact.  
 Podría tomar la forma de una app de propósito general. Una app montada en un handheld



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Día 2



EMPATHIZE

Enamorarse del problema no de la solución.

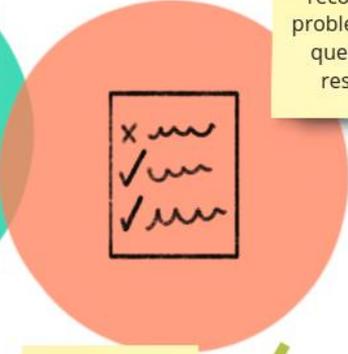
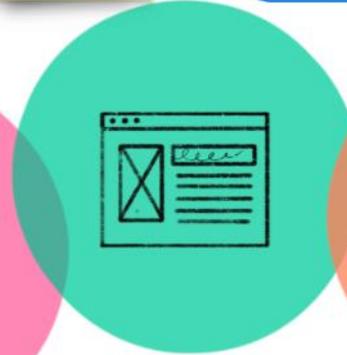
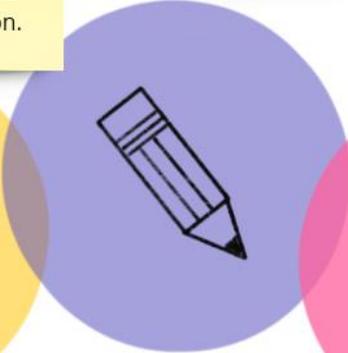
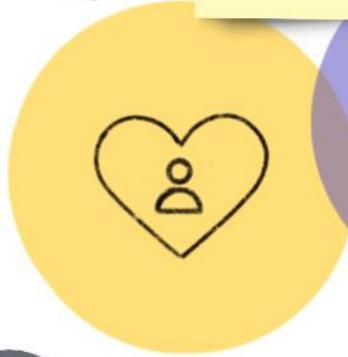
Asumido

Sin Limitaciones

IDEATE

TEST

Siempre recordar el problema que queremos resolver



DEFINE

Enfocarse en lo que importa

PROTOTYPE

Preguntar: Porque?



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Dia 2

## NASA Spaceapps Challenge - Zonda Incorporated

### Flood infrastructure damage estimation - via Sentinel-Hub

Sentinel - 1 Mission - European Space Agency

Select a Location

Uruguiana

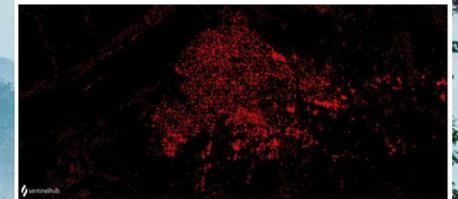
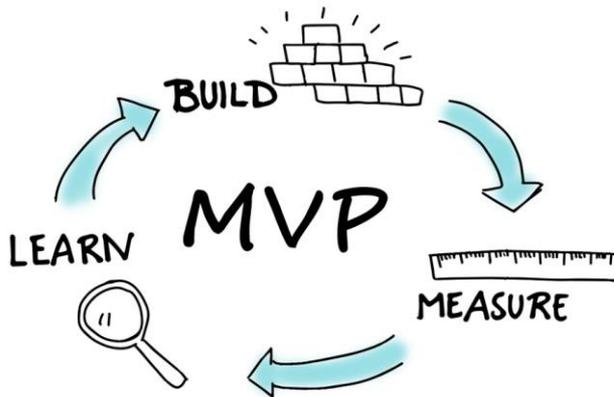
Date of the image

2019/01/07



© mapbox

© Mapbox © OpenStreetMap Improve this map



### Damage Report

	country	date	structure	damage	unit
21	Uruguiana	Jan 10, 2019 6:00 PM	Hospital	0	units
22	Uruguiana	Jan 10, 2019 6:00 PM	School	1	units
23	Uruguiana	Jan 10, 2019 6:00 PM	Library	0	units
24	Uruguiana	Jan 10, 2019 6:00 PM	Houses	150	units
25	Uruguiana	Jan 10, 2019 6:00 PM	Police Station	2	units
26	Uruguiana	Jan 10, 2019 6:00 PM	Road	42	km

### Cost calculation

$$\sum_{i=0}^n \text{unitcost} \cdot (\text{floodlevel} \cdot \text{damagescale})$$

- Total cost of flood damage (C5 index) = 2544000.0
- D1 (Critical Infrastructure Damage) = 167.7
- D5 (Index of Service Disruption) = 1.72

Clipboard Slides Font

Paste Copy New Slide Layout Reset Record Screen

Container Shapes Interactions Equation Arrange Click Fill Line

Variables Find HTML5 Preview

Reference Replace Editing Preview

**3** **Dia 2**

You are using the free or trial version of ActivePresenter. Some outputs will be watermarked. Close

Untitled1 - Untitled1\*



PROPERTIES - SLIDE

- General
- Background Fill
- Background Image
- Accessibility

TIMELINE

Main Timeline 0:00 0:04.267 0:10 0:15 0:20 0:25

Slide

Proyecto Flut Mapper ... Slide

**3**

**¿Cuál fue nuestro proyecto?**

3

## Flut Mapper

- Primera etapa: estudiar el impacto de una inundación en tiempo real sobre una región específica midiendo el nivel de subida del agua.



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## Flut Mapper

- Segunda etapa: Analizar el registro histórico para estimar el efecto de diferentes niveles de inundaciones y su probabilidad de ocurrencia



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## Flut Mapper

- Tercera etapa: Calcular el impacto económico directo e indirecto de una inundación, para determinar qué medidas de prevención y urbanismo son las más adecuadas para mitigar los daños que puedan ocurrir en una futura inundación.



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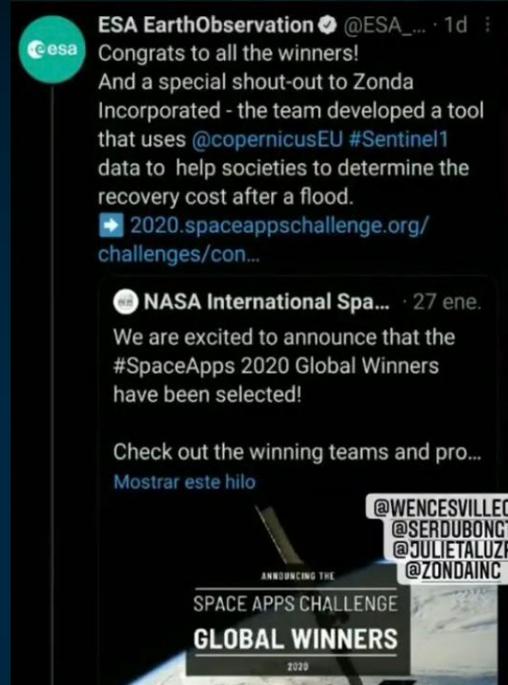
**¿Cómo fue nuestra  
experiencia?**



Team Zonda, who won the Euro Data Cube award, also tackled the challenge A Flood of Ideas. The award, sponsored by ESA, enables winners to broaden the geographic scope of their projects by using additional data and resources from the Euro Data Cube platform. Zonda teammate Wenceslao Villegas participated in hackathons before, but this was his first Space Apps. He and one of his teammates, from Argentina and Guatemala, respectively, have had firsthand experiences with flooding. The tool they created, **Flut Mapper – Remote Sensing**, not only uses satellite images to evaluate the scale of a flood and estimate the cost of economic damage to critical infrastructure, but can also simulate future flooding events. Villegas, who will soon graduate with a systems engineering degree, focused on making the image processing and their proof of concept work, while his teammates worked on researching how economic damage could be estimated. “We were not looking to win. We were just solving the problem, having a great time and learning a lot. So this is a huge surprise,” he said.



INGENIEROS MECÁNICOS DEL BALSEIRO, PREMIADOS POR LA NASA Y LA FUNDACIÓN SADOSKY



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## Zonda Inc



- Desarrollo del prototipo
- Asesoramiento con especialistas
- Constitución de la empresa
- Expansión del equipo
- Búsqueda de Financiamiento



## 4

## Consejos

- Equipo Multidisciplinario.
- Tendencia mundial a consumir productos que generen impacto.
- Iterar, validar y prototipar: equivocarse rápido.
- Definir ideas escalables.
- Pensar globalmente.
- Entender el problema / empatizar.
- Adaptar proyectos sociales a necesidades del mercado.
- Tomar en cuenta los objetivos de desarrollo sostenible de la ONU.

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¿Preguntas?



# ZONDA INC.

¡Muchas gracias por su atención!



INGENIERÍA PARA EL DESARROLLO  
DE UNA ARGENTINA COMPETITIVA



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[www.cai.org.ar](http://www.cai.org.ar)



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