

Final Presentation  
August 2, 2011

Eric Dudiak  
Nisha Kurani  
Clifton Lin  
Tony Poor  
Sony Verma

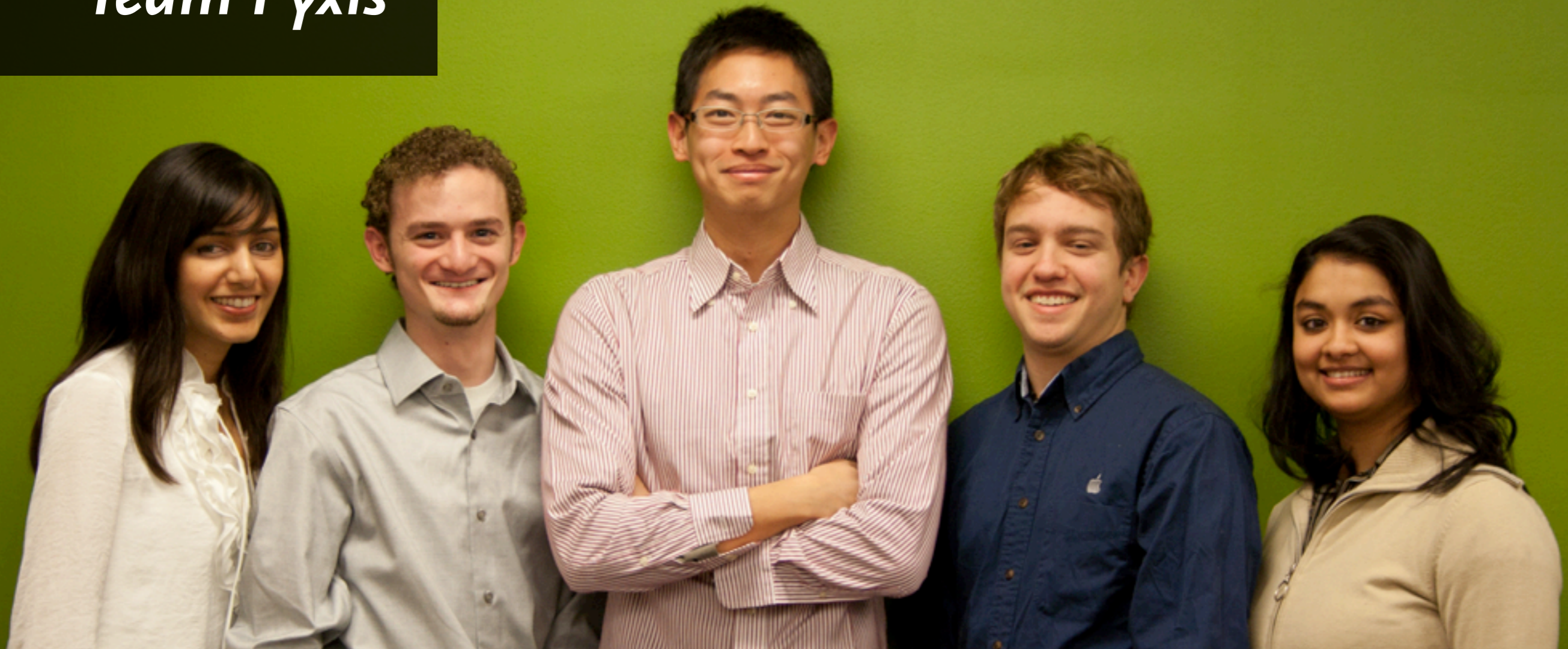
*team*

**PYXIS** (*pik·sis*)



Carnegie  
Mellon  
University

# Team Pyxis



**Nisha Kurani**  
*Co-Project Manager*

**Clifton Lin**  
*Co-Project Manager*

**Sony Verma**  
*Research Lead*

**Tony Poor**  
*Design Lead*

**Eric Dudiak**  
*Technical Lead*

## *About the HCII*

261-284  
Master of  
Human Computer  
Interaction  
Rooms 203-238

Carnegie Mellon's **Human-Computer Interaction Institute** is dedicated to research and education in topics related to technology that supports human activity. The two-semester **capstone project** connects teams of masters students with industry sponsors.

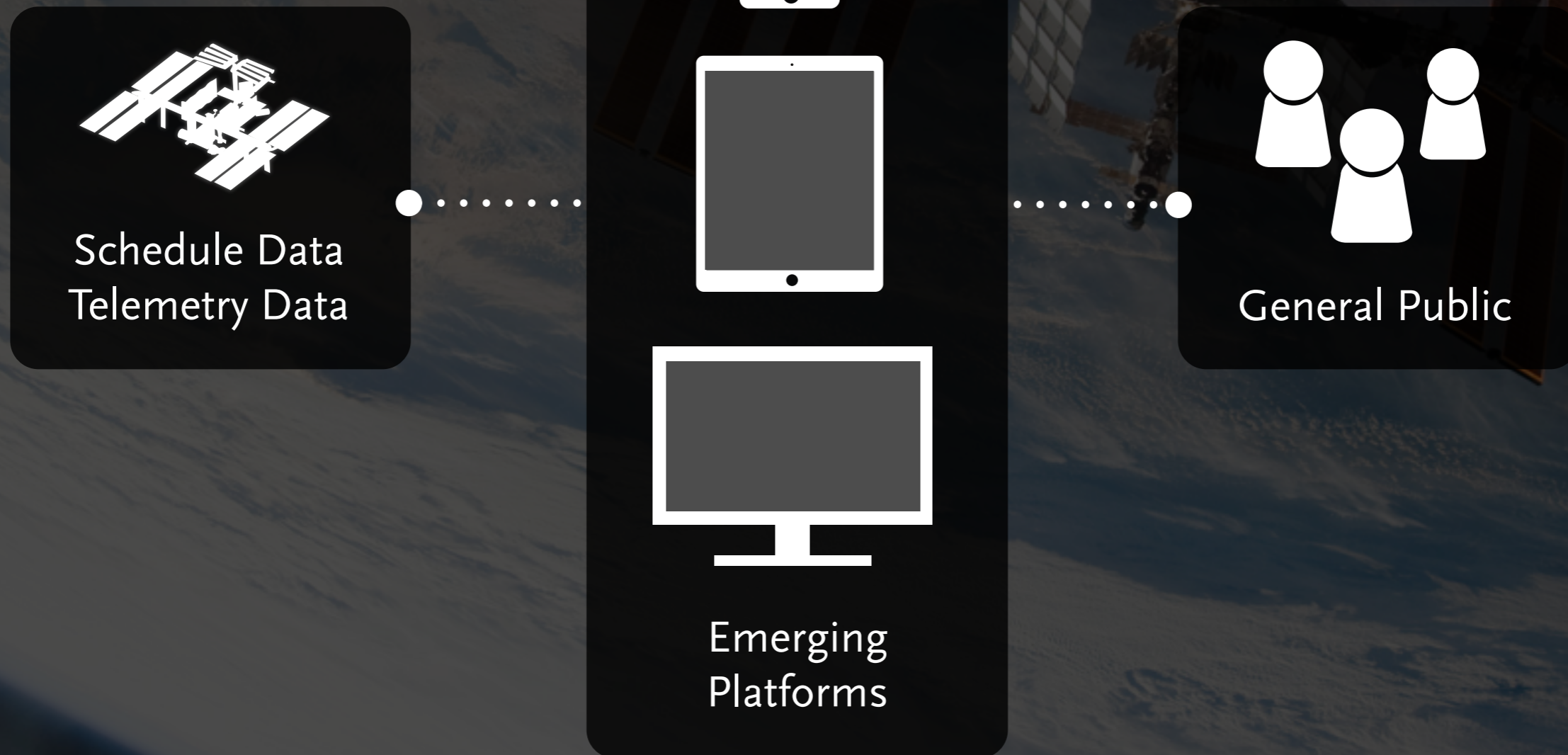
# *Our NASA Colleagues*

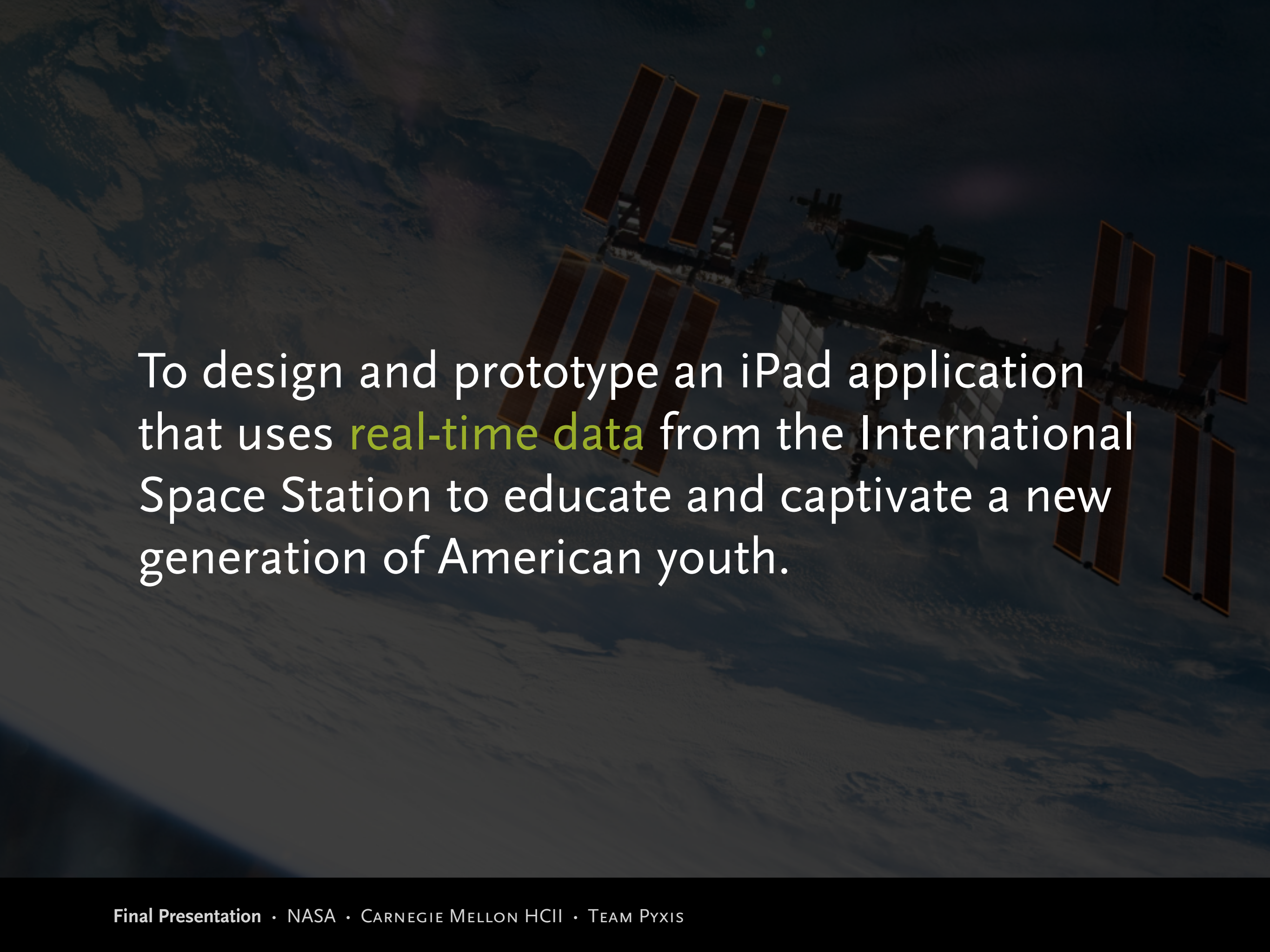






# The *ISS Live!* Project

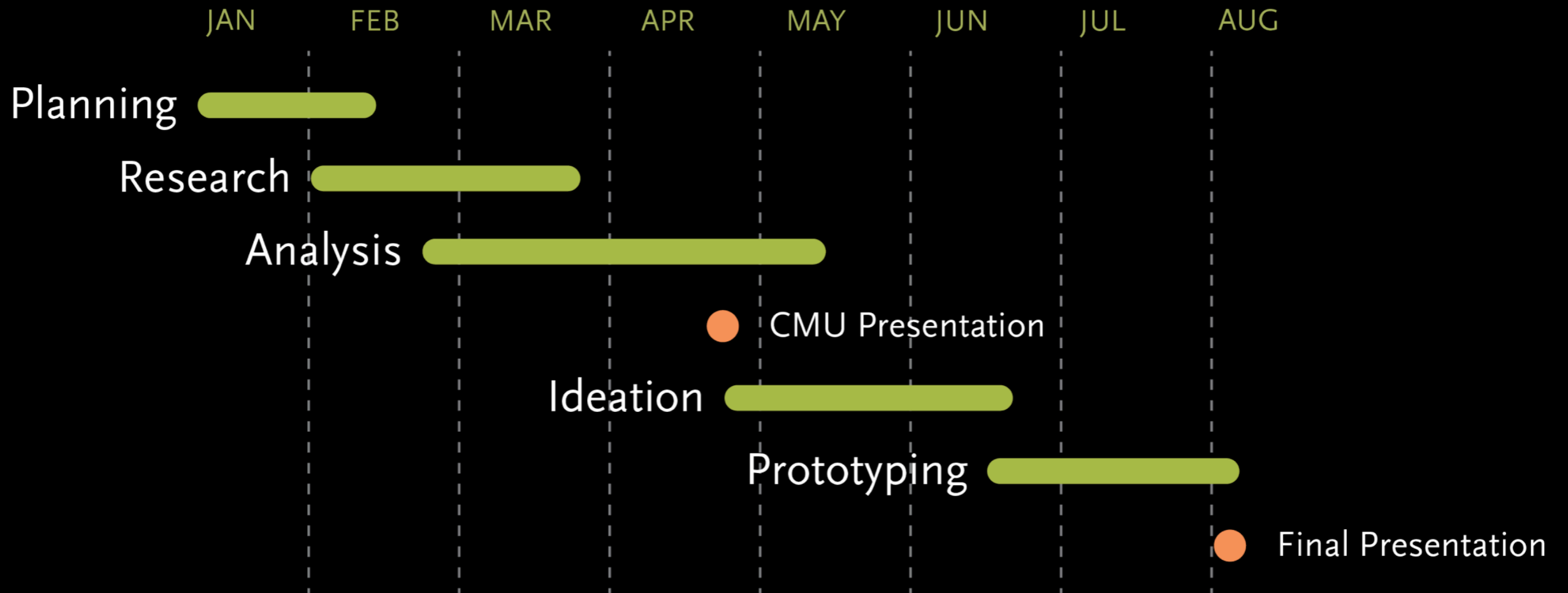


The background of the slide is a photograph of the International Space Station (ISS) in orbit above Earth. The station's complex structure, including its large solar panel arrays, is visible against the dark blue and black of space. The Earth's surface, showing clouds and the curvature of the planet, is visible in the lower-left corner.

To design and prototype an iPad application that uses **real-time data** from the International Space Station to educate and captivate a new generation of American youth.



# Overall Schedule



# *Today's Agenda*

- 1 Research
- 2 Solution
- 3 Process
- 4 Conclusion

---

1

# Research

# *Field Research Demographics*

# *Field Research Demographics*

## Students

*What are their goals and desires?  
What motivates them?*

# *Field Research Demographics*

NASA

*What are their objectives?  
What is interesting about the data?*

Students

*What are their goals and desires?  
What motivates them?*

# Field Research Demographics

## Educators

*How do they craft content and communicate scientific material?*

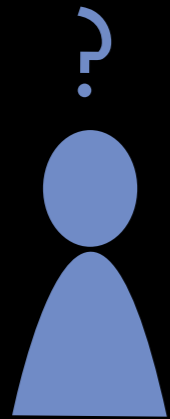


NASA

*What are their objectives?  
What is interesting about the data?*

Students

*What are their goals and desires?  
What motivates them?*



**1**  
*Captivate Students'  
Attention*



**2**  
*Create a  
Visceral Experience*



**3**  
*Relate it to  
their World*



**4**  
*Manage  
Interruptions*



Many teachers start off their class with a “hook”: something that attracts attention or serves as an enticement to draw students in.

5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 18.99	10 Ne 20.18
13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
31 Ga 69.72	32 Ge 72.64	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
82 Pb 207.2	83 Bi 208.98	84 Po 209	85 At (210)	86 Rn (222)	

Do It Now...

Is it possible that some of the oxygen  
you're breathing right now was once  
breathed by dinosaurs?





## *Captivate Students' Attention*

Curiosity arises from familiar topics with a new twist.

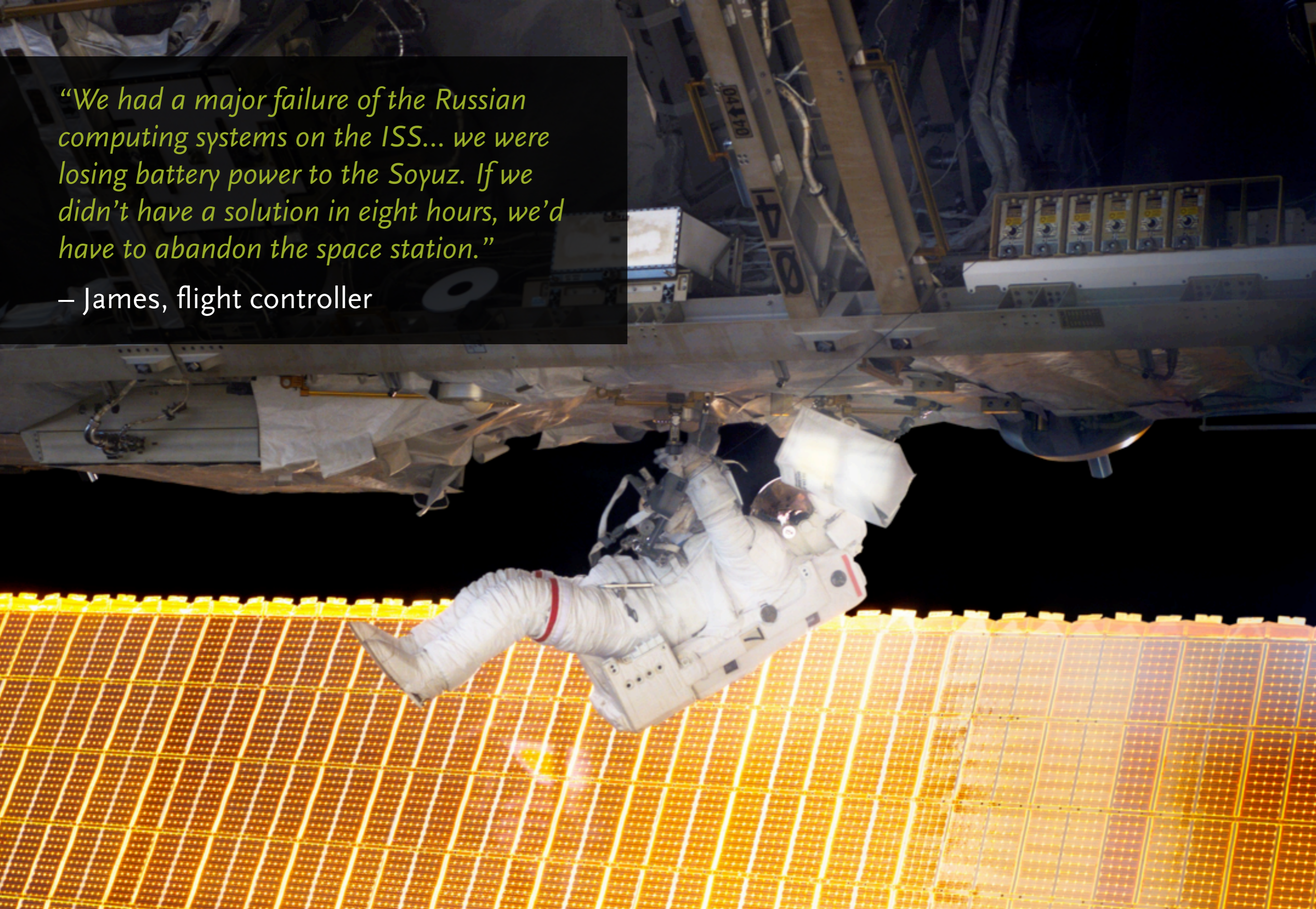
Students have diverse interests.

Visuals universally attract attention.

Hierarchy of information facilitates browsing.

*“We had a major failure of the Russian computing systems on the ISS... we were losing battery power to the Soyuz. If we didn’t have a solution in eight hours, we’d have to abandon the space station.”*

– James, flight controller





## *Create a Visceral Experience*

Hands-on presentation of information stands out.

Science experiments on the ISS is intriguing.

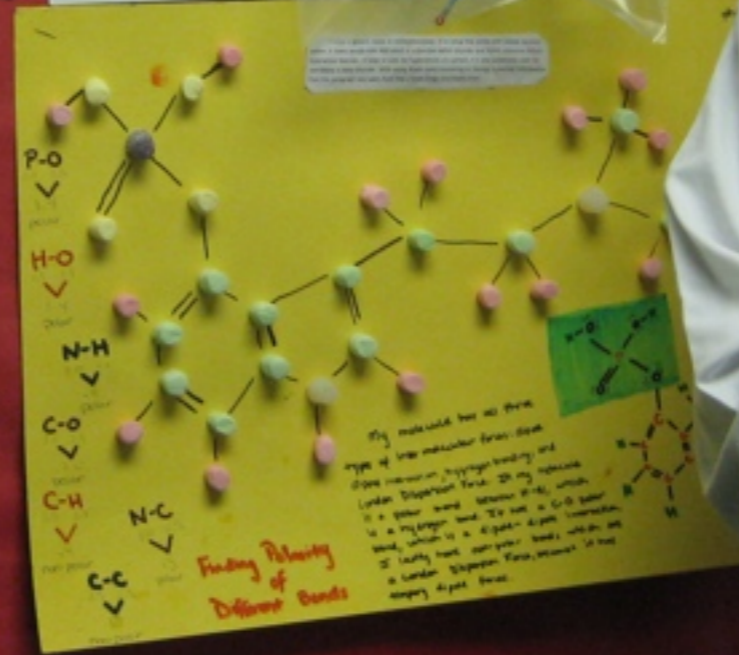
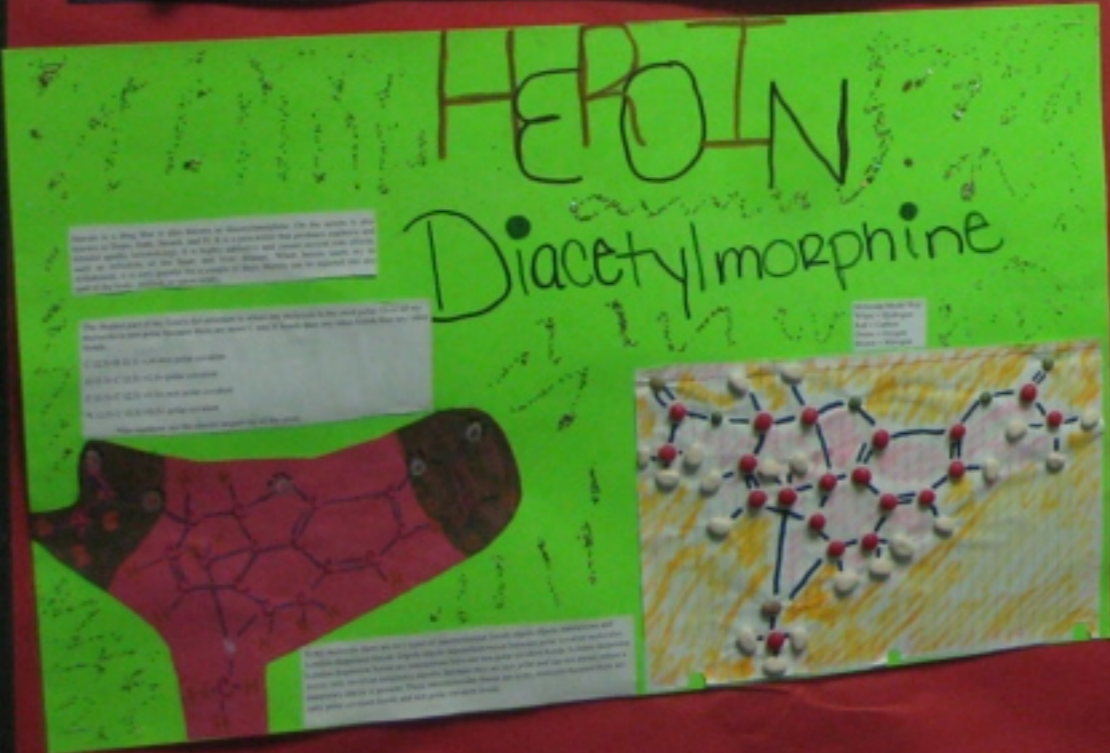
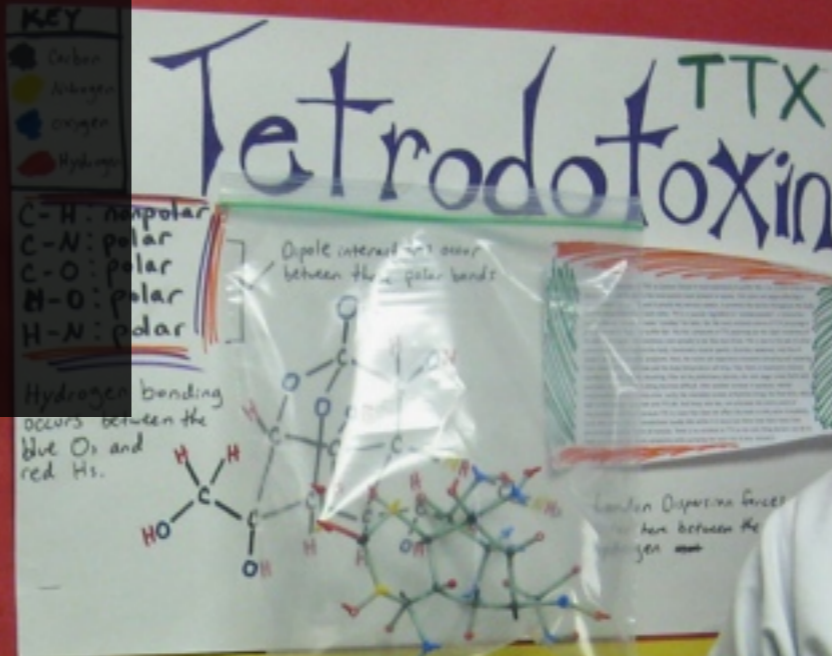
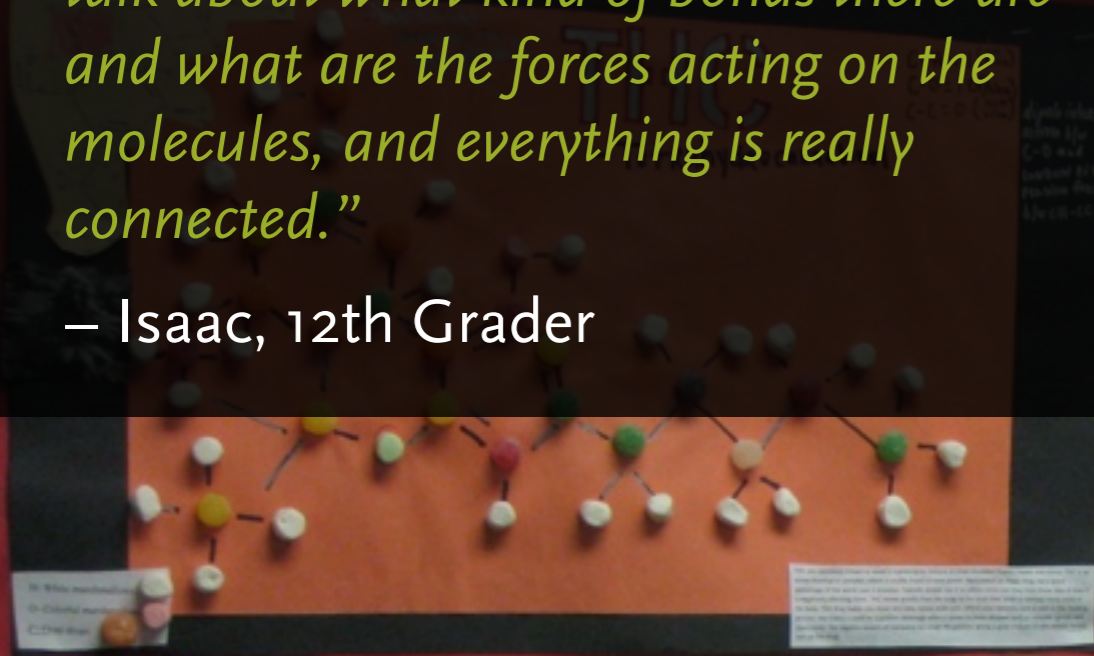
Technical details and experiential elements of life in space interest students.

Emotion increases excitement and memorability.

High risk activities are most interesting.

“You can go even deeper in physics and talk about what kind of bonds there are and what are the forces acting on the molecules, and everything is really connected.”

– Isaac, 12th Grader





## *Relate It To Their World*

Familiarity facilitates interest.

Students want to see value in what they learn.

Different perspectives enrich the story.

Camaraderie resonates with students and flight controllers.

Mobile design takes into account context of use, short attention span, and is designed for interruptibility.





## *Manage Interruptions*

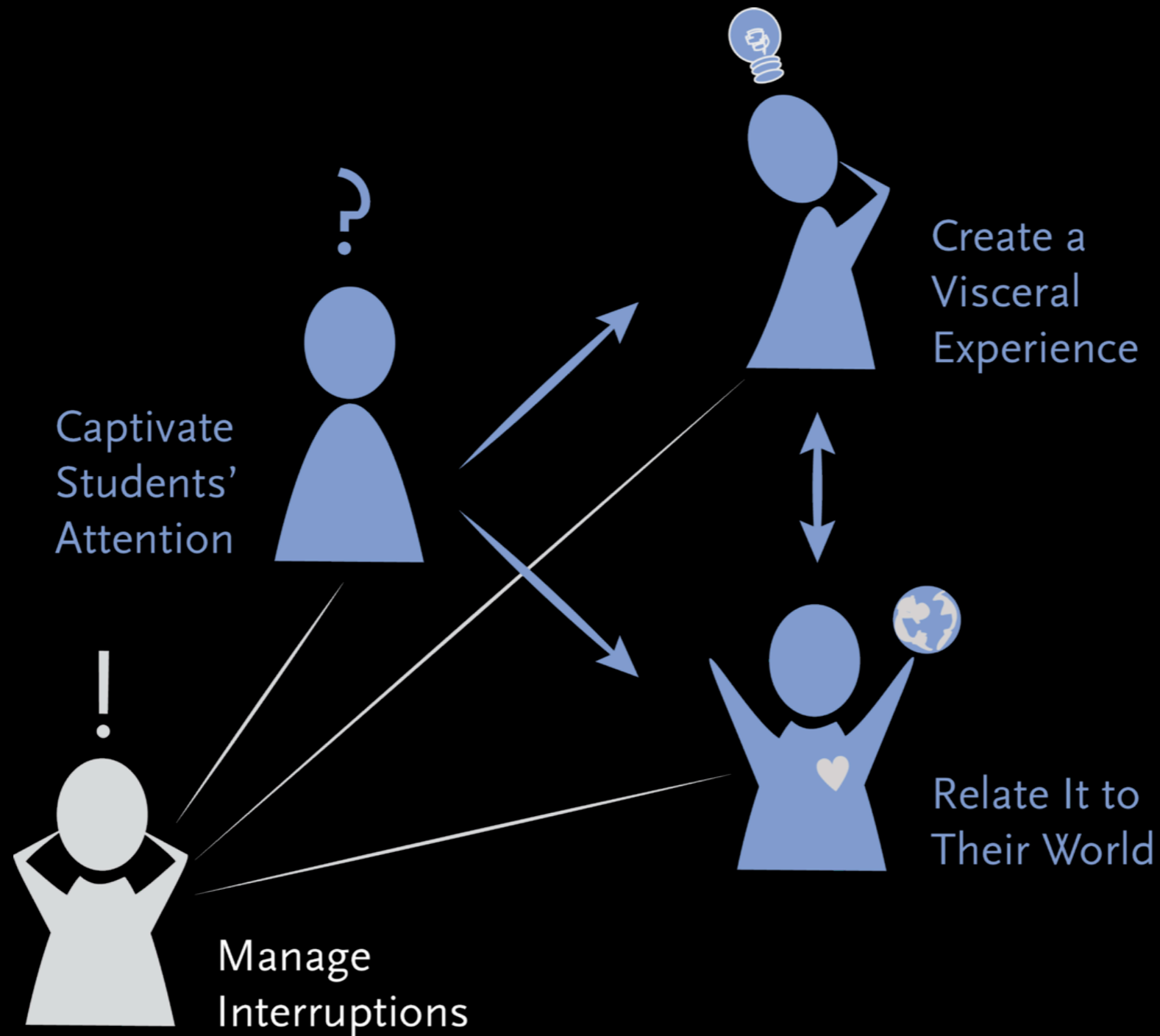
Allow the users to flexibly enter and exit the application.

Minimize interruptions to workflow and user goals.

Put users in control in the process of interaction.



# Theme Relationship



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2

# Solution

# Introducing: ISS *Watch*

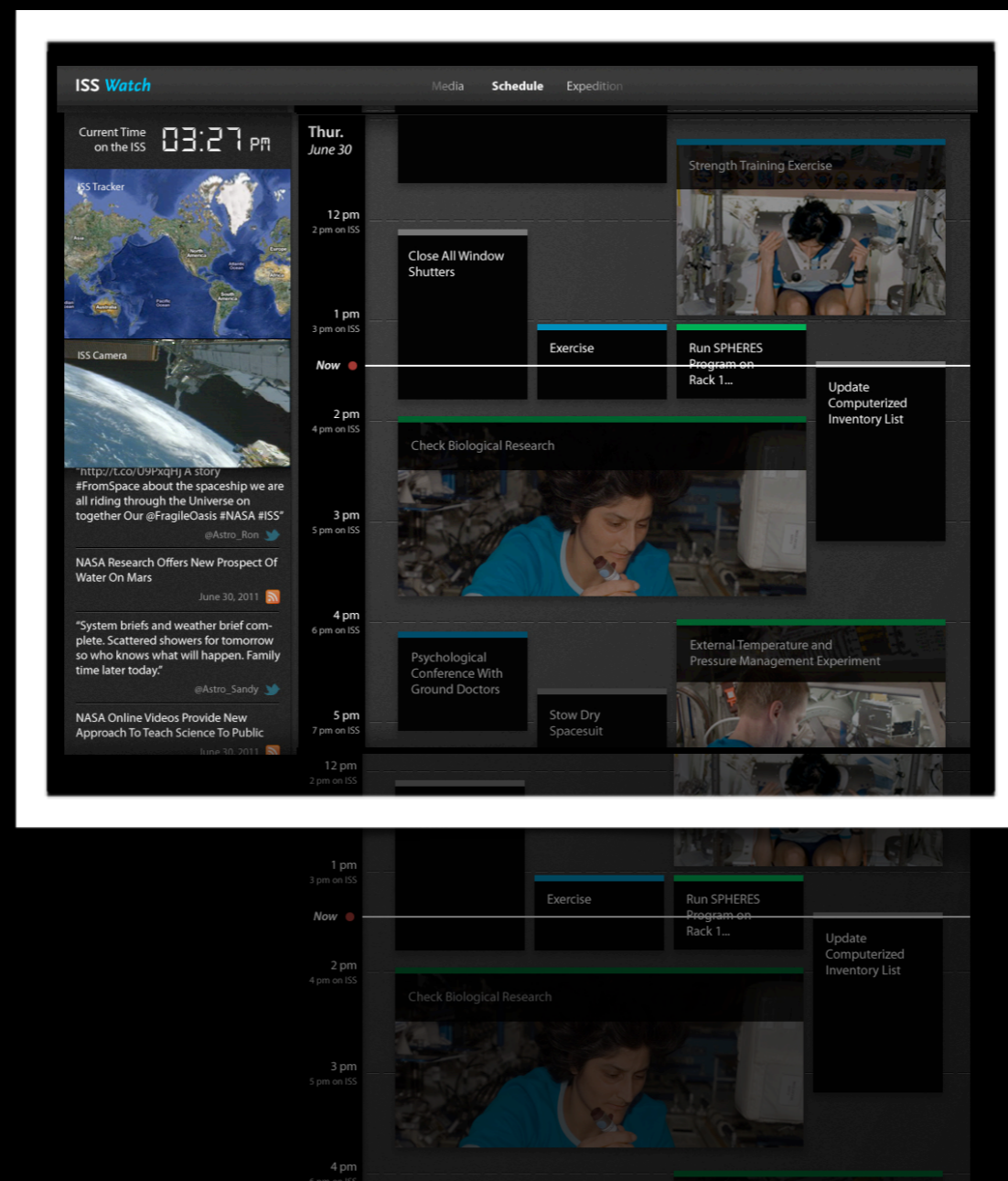
An iPad application that presents real-time station information to encourage high school students to explore and learn more.







# Schedule



# Schedule

# Expedition

**ISS Watch** Media Schedule Expedition

Current Time on the ISS **03:27 PM** **Thur. June 30**

12 pm 2 pm on ISS Strength Training Exercise

1 pm 3 pm on ISS Close All Window Shutters Exercise Run SPHERES Program on Rack 1... Update Computerized Inventory List

Now

2 pm 4 pm on ISS Check Biological Research

3 pm 5 pm on ISS Psychological Conference With Ground Doctors External Temperature and Pressure Management Experiment

4 pm 6 pm on ISS Stow Dry Spacesuit

5 pm 7 pm on ISS Kids in Microgravity

12 pm 2 pm on ISS

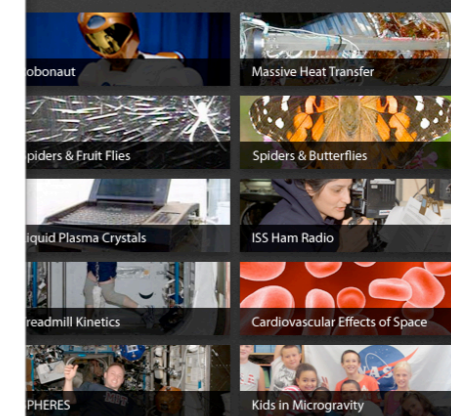
## Expedition 28

July, 2011 – September, 2011

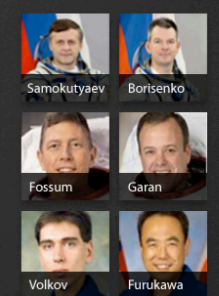
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### Featured Experiments



### Expedition Crew



## Robonaut

[Back to Expedition](#) ↑

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Robonaut is capable of lifting weight up to 50 pounds, and more caption text here.

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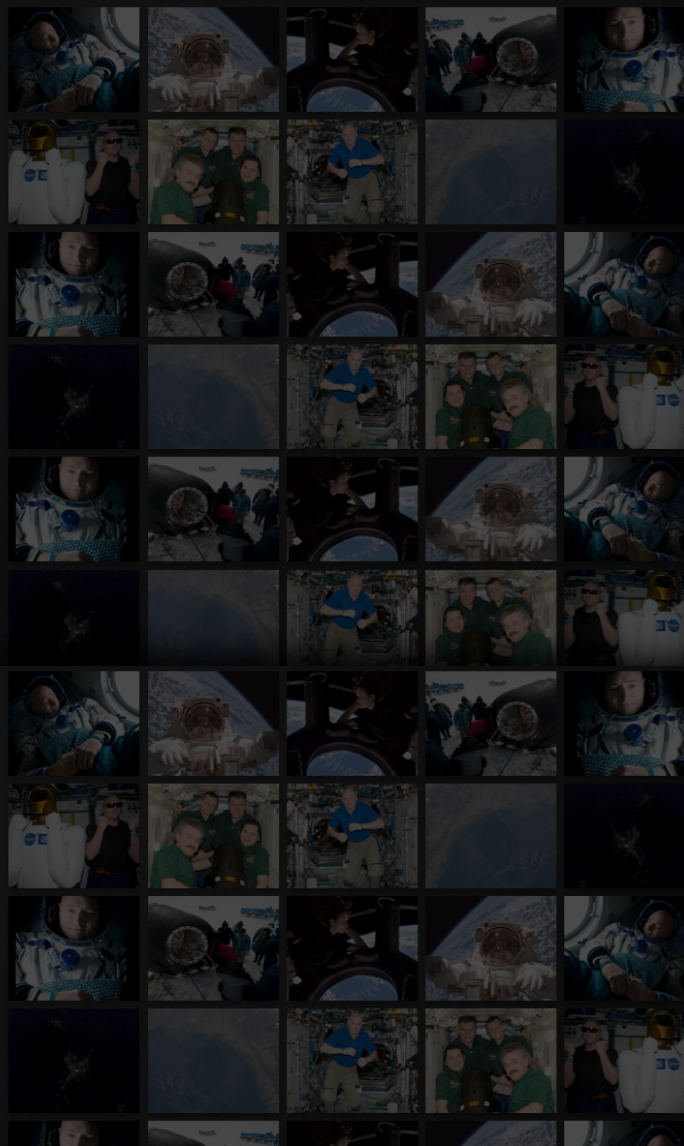




# Media

# Schedule

# Expedition



**ISS Watch** Media Schedule Expedition

Current Time on the ISS **03:27 PM** **Thur. June 30**

ISS Tracker

ISS Camera

<http://t.co/U9P-xqHj> A story #FromSpace about the spaceship we are all riding through the Universe on together Our @FragileOasis #NASA #ISS\* @Astro\_Ron

NASA Research Offers New Prospect Of Water On Mars June 30, 2011 @Astro\_Sandy

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NASA Online Videos Provide New Approach To Teach Science To Public June 30, 2011

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4 pm 6 pm on ISS	Stow Dry Spacesuit
5 pm 7 pm on ISS	
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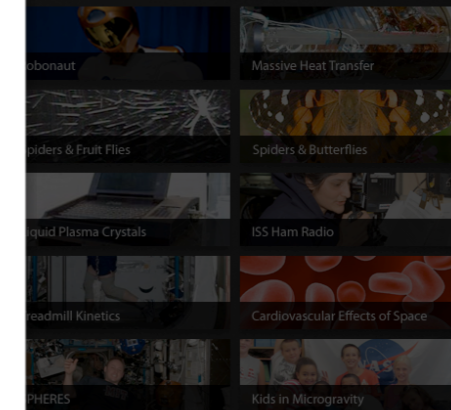
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2011 - September, 2011

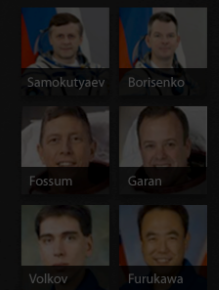
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### Featured Experiments



### Expedition Crew



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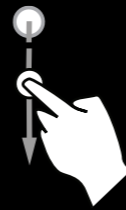
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**Vertical Scroll**  
navigates in depth of each  
sections for further content

# Media

# Schedule

# Expedition



**ISS Watch** Media Schedule Expedition

Current Time on the ISS **03:27 PM** **Thur. June 30**

ISS Tracker

ISS Camera

Strength Training Exercise

Close All Window Shutters

Exercise

Run SPHERES Program on Rack 1...

Update Computerized Inventory List

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July 2011 – September, 2011

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Featured Experiments

- Robonaut
- Massive Heat Transfer
- Spiders & Fruit Flies
- Spiders & Butterflies
- Liquid Plasma Crystals
- ISS Ham Radio
- Treadmill Kinetics
- Cardiovascular Effects of Space
- SPHERES
- Kids in Microgravity

Expedition Crew

- Samokutyaev
- Borisenko
- Fossum
- Garan
- Volkov
- Furukawa

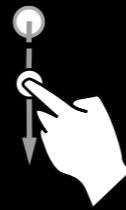
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# Expedition



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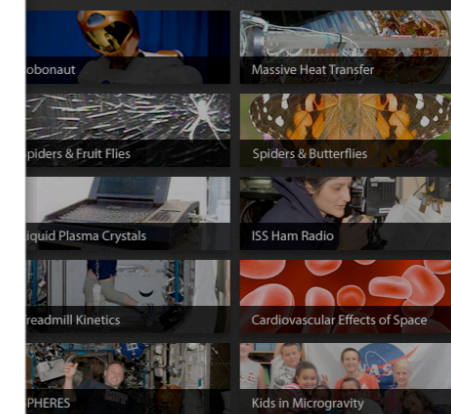
## Expedition 28

July 28, 2011 – September, 2011

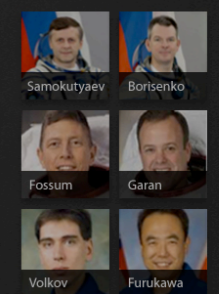
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### Featured Experiments



### Expedition Crew



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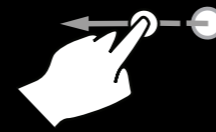
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## Horizontal Swipe

navigates between the 3 main sections of the application

# Media

# Schedule

# Expedition

ISS Watch

Media Schedule Expedition

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Thur. June 30

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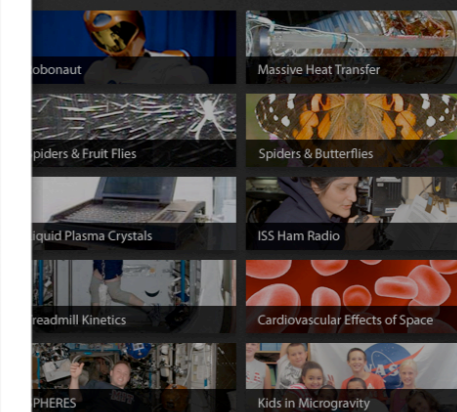
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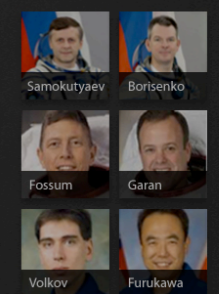
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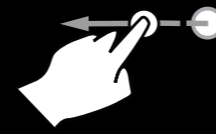
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**Horizontal Swipe**  
navigates between the 3 main  
sections of the application

Schedule

Expedition

The screenshot displays the ISS Watch application interface. The top navigation bar includes 'Media', 'Schedule', and 'Expedition'. The 'Schedule' section on the left shows a vertical timeline for Thursday, June 30, with activities such as 'Close All Window Shutters', 'Exercise', 'Run SPHERES Program on Rack 1...', 'Check Biological Research', 'Psychological Conference With Ground Doctors', and 'Stow Dry Spacesuit'. The 'Expedition' section on the right features a 'Current Time on the ISS' of 03:27 PM, a map of the ISS, and a detailed view of Expedition 28 (May 2011 - September 2011). It includes a description of the ISS, a list of featured experiments (Robonaut, Massive Heat Transfer, Spiders & Fruit Flies, Spiders & Butterflies, Liquid Plasma Crystals, ISS Ham Radio, Treadmill Kinetics, Cardiovascular Effects of Space, SPHERES, Kids in Microgravity), and the Expedition Crew members (Samokutyaev, Borisenko, Fossum, Garan, Volkov, Furukawa). A 'Robonaut' section at the bottom provides information about the dexterous humanoid robot.



Tap

Dive in depth into contents within each section

# Expedition

The screenshot shows the 'ISS Watch' website interface. At the top, there are navigation tabs for 'Media', 'Schedule', and 'Expedition'. The main content area is titled 'Expedition 28' and includes a 'Current Time on the ISS' of 03:27 PM. Below this, there is an 'ISS Tracker' map, an 'ISS Camera' feed, and a list of tweets. The 'Featured Experiments' section displays a grid of experiment thumbnails including 'Robonaut', 'Massive Heat Transfer', 'Spiders & Fruit Flies', 'Spiders & Butterflies', 'Liquid Plasma Crystals', 'ISS Ham Radio', 'Treadmill Kinetics', and 'Cardiovascular Effects of Space'. The 'Expedition Crew' section shows portraits of crew members: Samokutyaev, Borisenko, Fossum, Garan, Volkov, and Furukawa.

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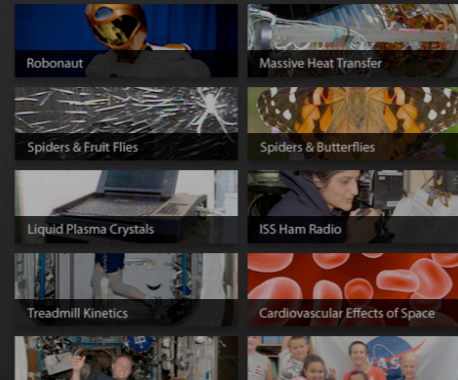
## Expedition 28

May, 2011 – September, 2011

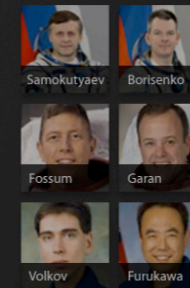
The International Space Station (ISS) is brief description of the ISS here, touting hundreds of experiments and so forth content needs to be written. Introduce expeditions: these cycles, called "expeditions," do so-and-so and brief description of an expedition.

**Expedition 28** is the current expedition and is devoted to research in a variety of topics, including how humanoid robots can operate in space, heat transfer processes that could lead to better cooling systems on Earth, and even the effects of low gravity on insects and plants.

### Featured Experiments



### Expedition Crew



## ISS Watch

Media **Schedule** Expedition

Current Time on the ISS **03:27 PM**



<http://t.co/U9P-xqHj> A story #FromSpace about the spaceship we are all riding through the Universe on together Our @FragileOasis #NASA #ISS\*  
@Astro\_Ron

NASA Research Offers New Prospect Of Water On Mars  
June 30, 2011

\*System briefs and weather brief complete. Scattered showers for tomorrow so who knows what will happen. Family time later today.  
@Astro\_Sandy

NASA Online Videos Provide New Approach To Teach Science To Public  
June 30, 2011

## Robonaut

[Back to Expedition](#) ↑

A Robonaut is a dexterous humanoid robot built and designed at NASA Johnson Space Center in Houston, Texas. Our challenge is to build machines that can help humans work and explore in space. Working side by side with humans, or going where the risks are too great for people, Robonauts will expand our ability for construction and discovery. Central to that effort is a capability we call dexterous manipulation, embodied by an ability to use one's hand to do work, and our challenge has been to build machines with dexterity that exceeds that of a suited astronaut.

There are currently four Robonauts, with others currently in development. This allows us to study various types of mobility, control methods, and task applications. The value of a humanoid over other designs is the ability to use the same workspace and tools - not only does this improve efficiency in the types of tools, but also removes the need for specialized robotic connectors. Robonauts are essential to NASA's future as we go beyond low earth orbit and continue to explore the vast wonder that is space.

Robonaut 2 or R2, launched to the International Space Station on space shuttle Discovery as part of the STS-133 mission. It is the first dexterous humanoid robot in space, and the first US-built robot at the space station. But that was just one small step for a robot and one giant leap for robot-kind.

Initially R2 will be deployed on a fixed pedestal inside the ISS. Next steps include a leg for climbing through the corridors of the Space Station, upgrades for R2 to go outside into the vacuum of space, and then future lower bodies like legs and wheels to propel the R2 across Lunar and Martian terrain. A four wheeled rover called Centaur 2 is being evaluated at the 2010 Desert Field Test in Arizona as an example of these future lower bodies for R2.



Robonaut is capable of lifting weight up to 50 pounds, and more caption text here.



Robonaut 2 practicing with its ISS taskboard.

# *With the Insights in Mind*



Captivate Students' Attention



Create a Visceral Experience



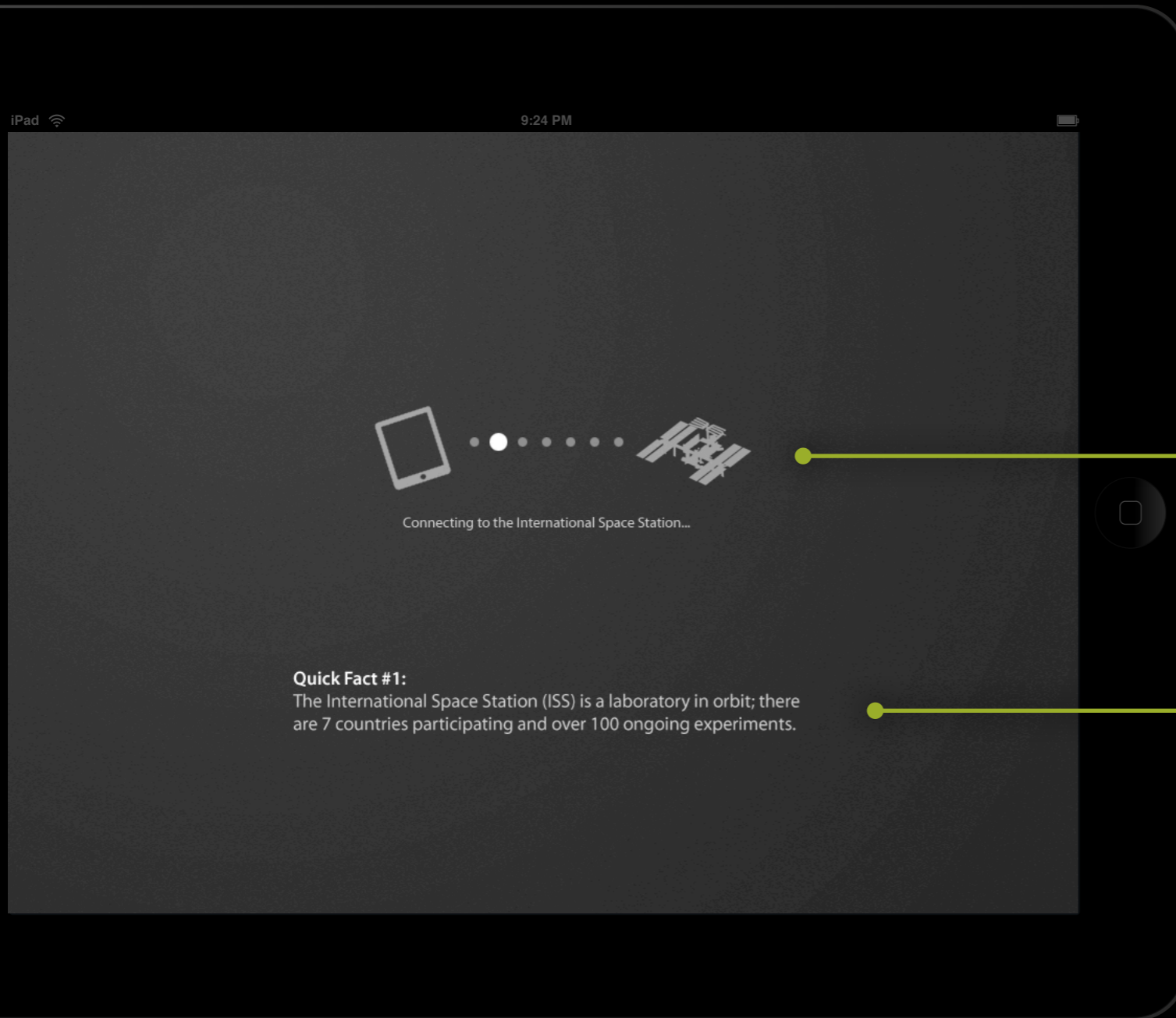
Relate it to Their World



Manage Interruptions



# Loading Screen



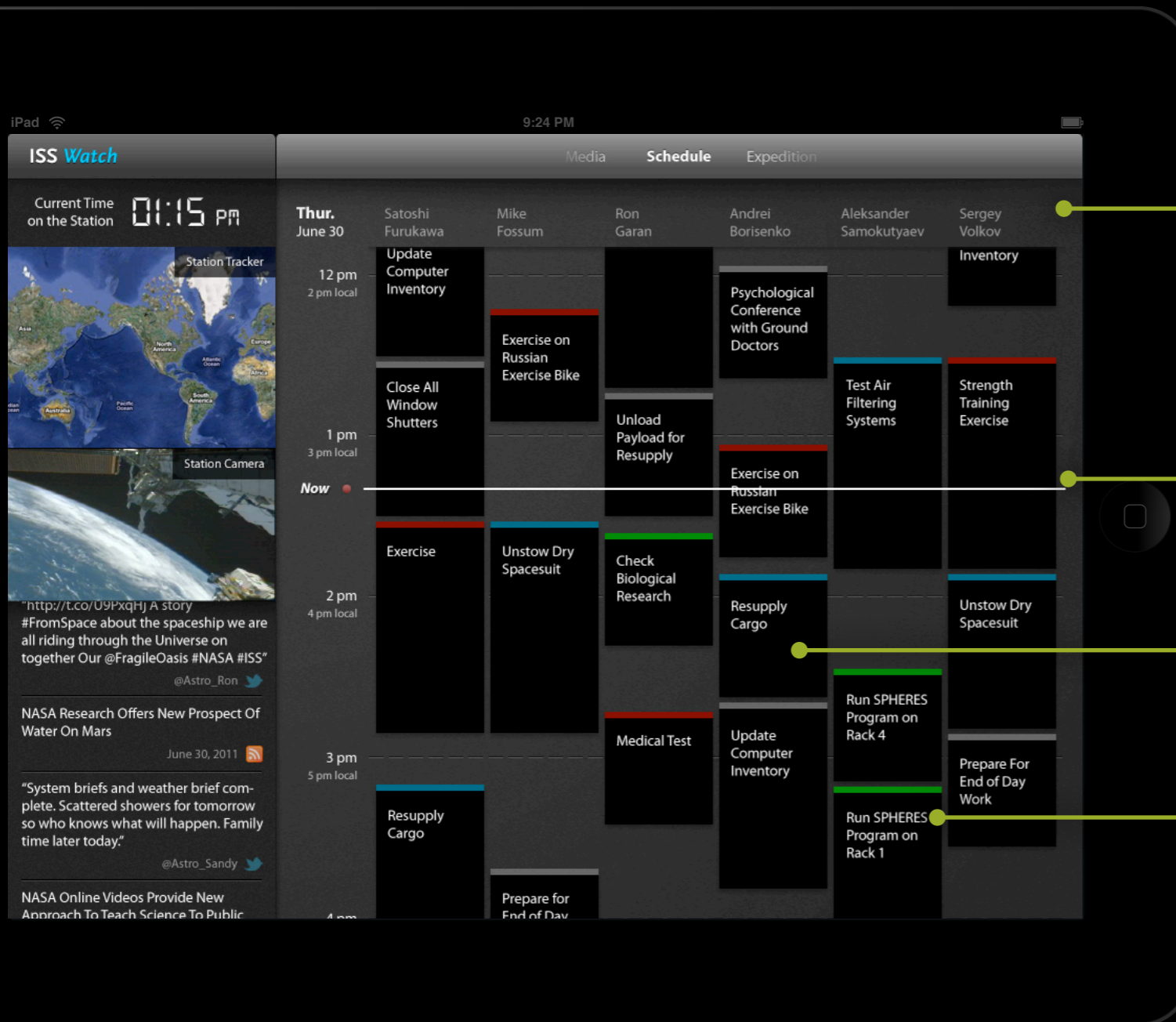
Simulation of synchronizing with the station



Provide quick fact to make the wait time meaningful



# Schedule Screen



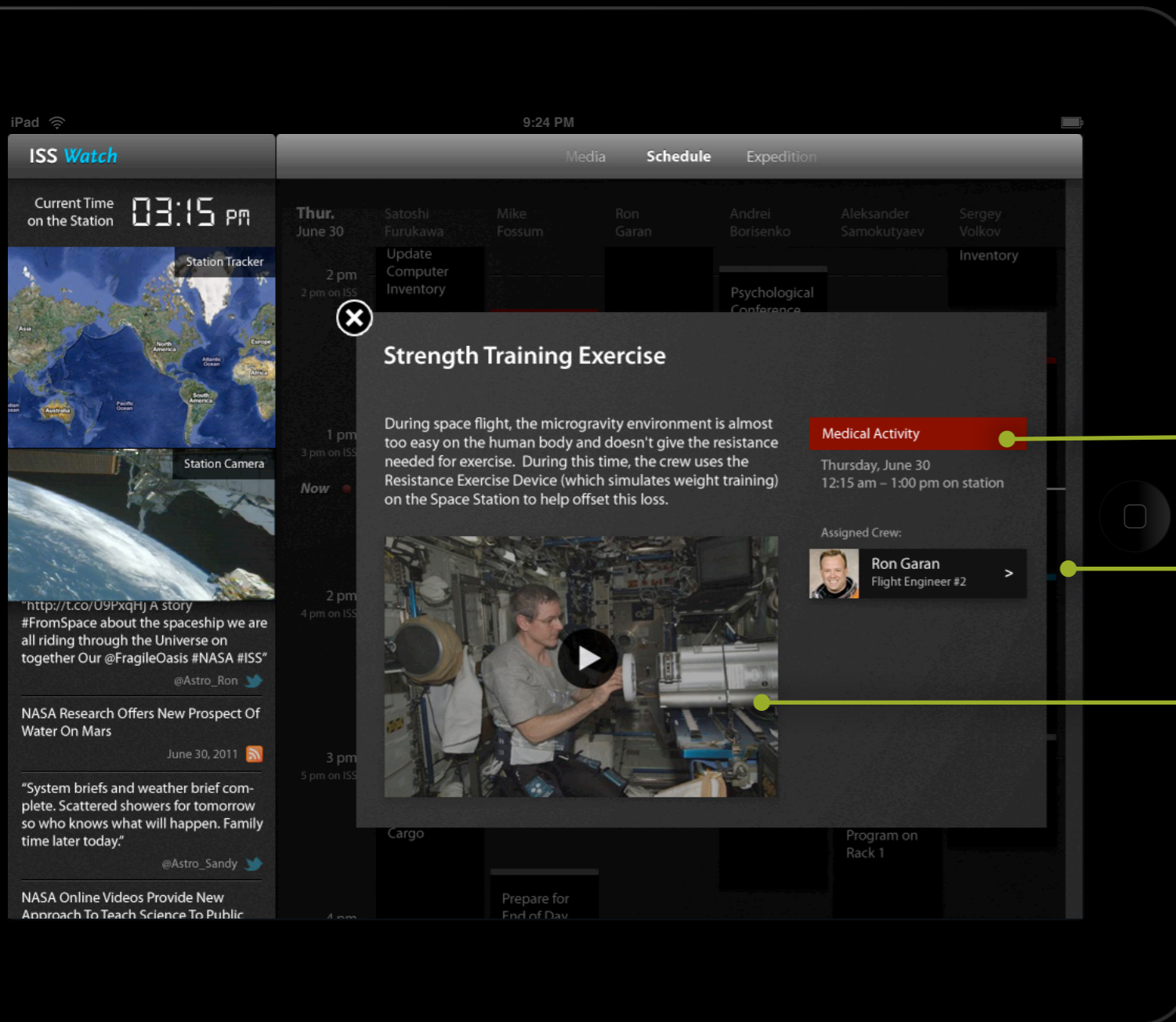
Scrollable timeline

Now line clearly indicates current activities

Tap-able timeline activity blocks brings out detail popover

Blocks are color-coded by category

# Activity Detail Popover



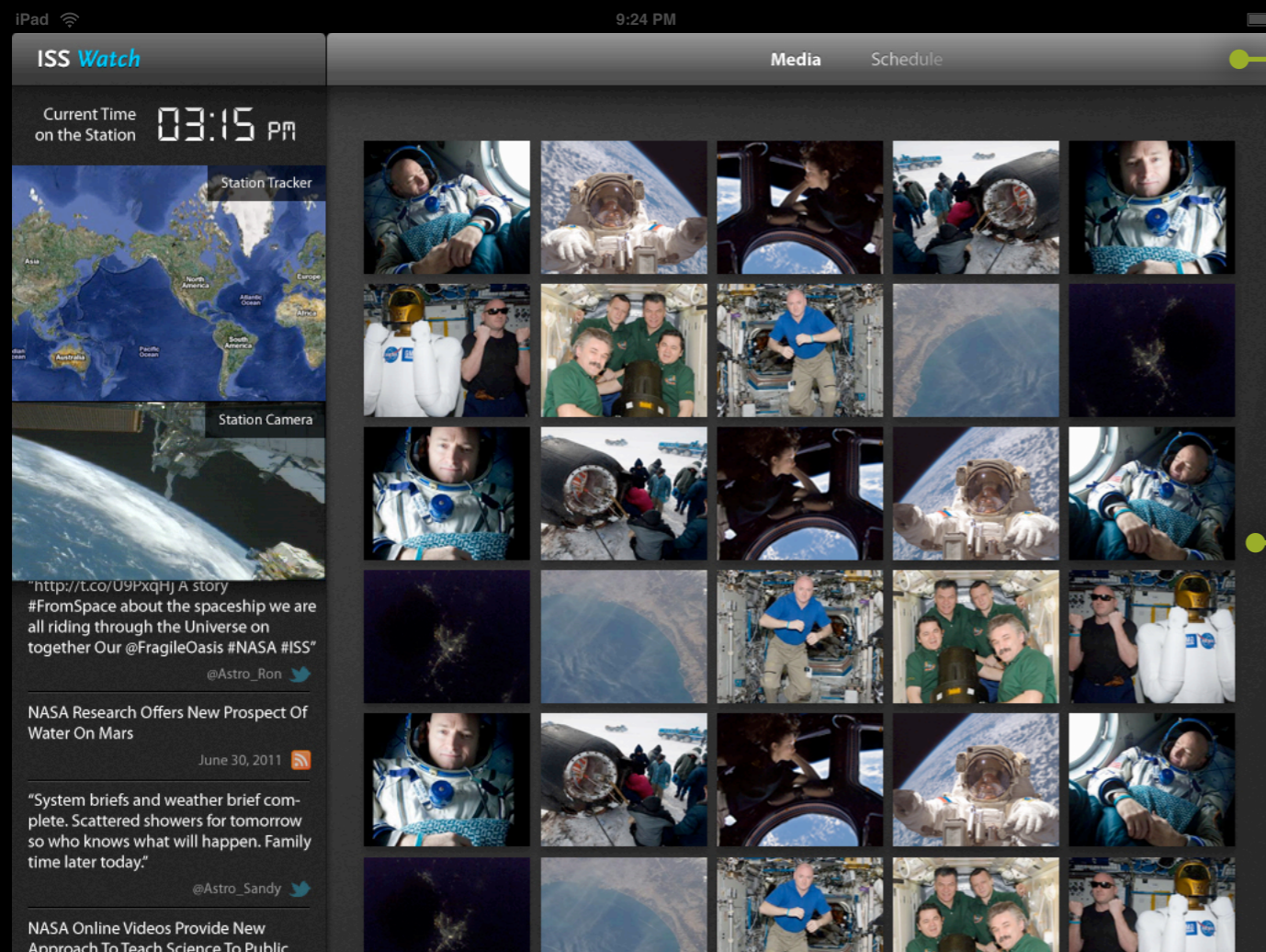
Category label

List of astronauts assigned

Description and media



# Media Gallery

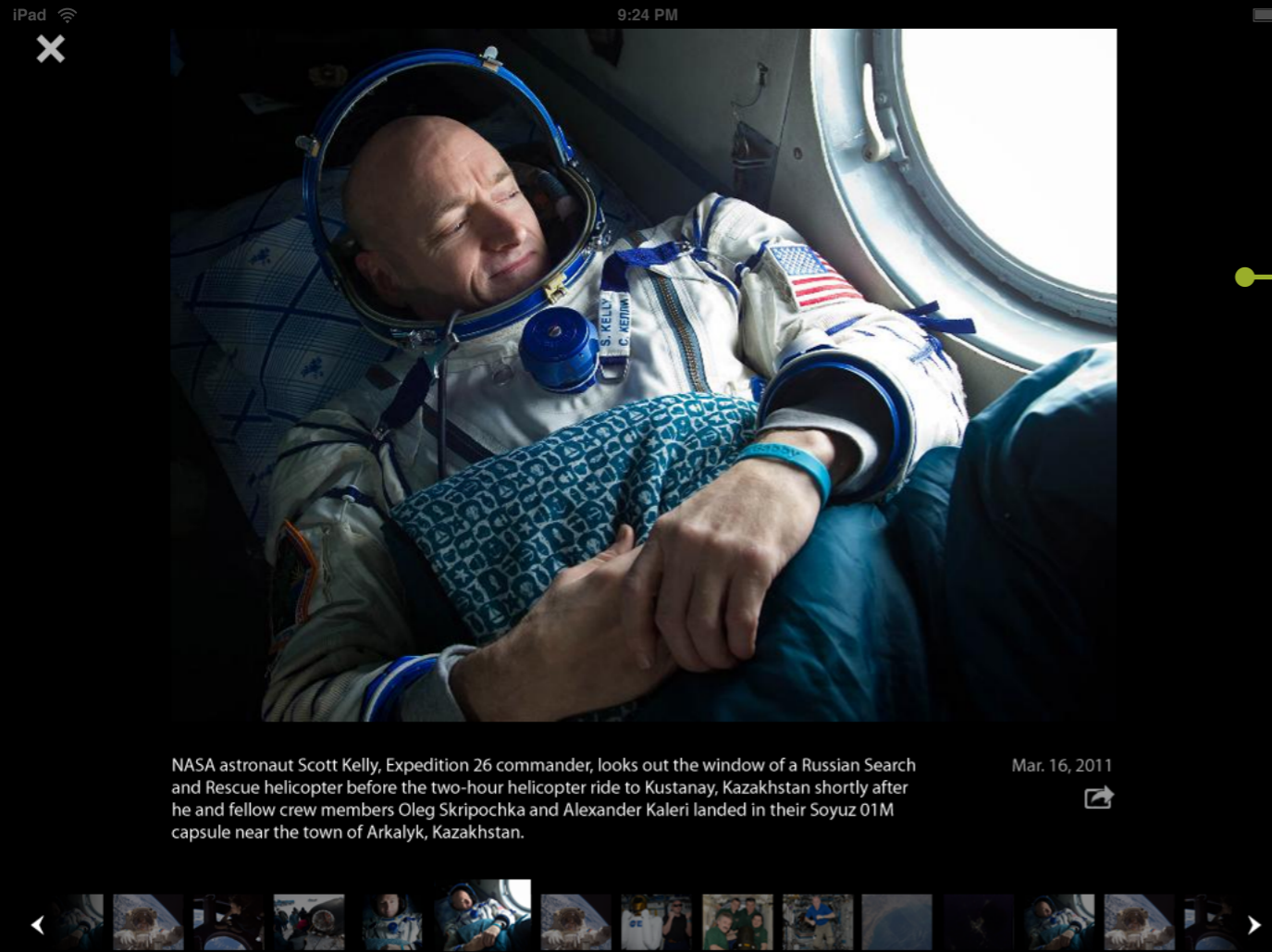


Toggle switch between types of media

Scrollable collage of images and/or videos



# Media Detail



Enlarged image with descriptions



Filmstrip supporting quick navigation through media

# Expedition Screen



Overall description of the expedition/space station



Astronauts on board this expedition

Featured experiments



# Astronaut Screen

iPad 9:24 PM

ISS Watch Schedule Expedition

Current Time on the Station 03:15 PM

Station Tracker

Station Camera

## Mike Fossum Expedition ↑

*"Some people explore the depths of the ocean; some people explore the heavens."*

### Why did you want to be an astronaut?

I was born two months after Sputnik launched, so I was really kind of a child of the Space Age. I, and my dad thought that the space business and America's space program was an important thing and he'd get us up in the middle of the night to watch the missions, and I remember as a kid having the models and having the maps and I'd be plotting where they were as they went from the Earth to the moon in their orbit, where are they landing and I'd have the moon map and a pin for the next flight and those kind of things, and I just, like every other, just red-blooded kid in the whole world, I think, I dreamed about flying in space. Maybe one thing that is different is I never completely gave up on that dream, for me it comes with so many different angles to it, I mean. My ancestors were pioneers primarily in South Dakota, that came across, came from Europe, and were looking for new opportunity and they endured hardships and lived in very cramped conditions and had suffered through some awful harsh winters as they tried to figure out how to carve out their own place and create a way to live and to prosper. I think part of that pioneering spirit's still alive, it's still alive in all of us and I feel like it is in me.

**I'm going to get you to tell us about the Mike Fossum Story. Let's start in your hometown. Tell me about McAllen, Texas, and what it was like to grow up there.**

McAllen, Texas, is located down in the south tip of Texas, right on the Rio Grande River, and it was a great place to grow up. It was kind of on the edge of the United States in ways, there was a lot of open land down there and great folks. Some of my best friends in the world are still down there. It was kind of an odd mix of Hispanic culture with a strong

Flight Engineer #6 (NASA, American)  
Born: March 21, 1962 in Jamestown, VA  
MS in Mechanical Engineering  
PhD in Human Aeronautics & Spaceflight

### Twitter

Since a bunch of people are asking... Yes we're still in space. Scheduled to return to Earth #FromSpace Sept 8th  
4 hours ago

RT #StillFromSpace @FragileOasis W/ the #STS-135 crew safely back on Earth, Ron takes you behind the scenes #FromSpace  
7 hours ago

@SethGreen talks about @FragileOasis on Conan last night RT @TeamCoco Seth revealed he has friends in OUTER SPACE bit.ly/nkmZz1 #FromSpace  
20 July

NASA Research Offers New Prospect Of Water On Mars  
June 30, 2011

"System briefs and weather brief complete. Scattered showers for tomorrow so who knows what will happen. Family time later today."  
@Astro\_Sandy

NASA Online Videos Provide New Approach To Teach Science To Public

Picture and short astronaut biography

Tweets (when available)

Quote and preflight interview

# Experiment Screen

The screenshot shows an iPad application interface. At the top, it displays 'iPad', signal strength, and the time '9:24 PM'. The main header is 'ISS Watch' with sub-tabs for 'Schedule' and 'Expedition'. The left sidebar contains: 'Current Time on the Station 03:15 PM', 'Station Tracker' (a world map), 'Station Camera' (a view of Earth from space), and a list of news items including a tweet and a NASA article. The main content area is titled 'Robonaut' and features a 'Long description of the experiment' (two paragraphs of text), a 'Related media (when available)' section with two images (a full-body view and a close-up of the head), and a 'Home' button at the bottom.

Long description of the experiment

Related media (when available)



# Real-time Panel

Station clock



Real-time station tracking



Live video from the station



Live stream of tweets and newsfeed

iPad 9:24 PM

**ISS Watch**

Current Time on the Station **01:15 PM**

Station Tracker

Station Camera

“<http://t.co/U9PxqHJ> A story #FromSpace about the spaceship we are all riding through the Universe on together Our @FragileOasis #NASA #ISS”  
@Astro\_Ron

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NASA Online Videos Provide New Approach To Teach Science To Public

**Media**

Thur. June 30

Satoshi Furukawa

Mike Fossum

Ron Garan

12 pm 2 pm local

Update Computer Inventory

Exercise on Russian Exercise Bike

1 pm 3 pm local

Close All Window Shutters

**Now**

2 pm 4 pm local

Exercise

Unstow Dry Spacesuit

3 pm 5 pm local

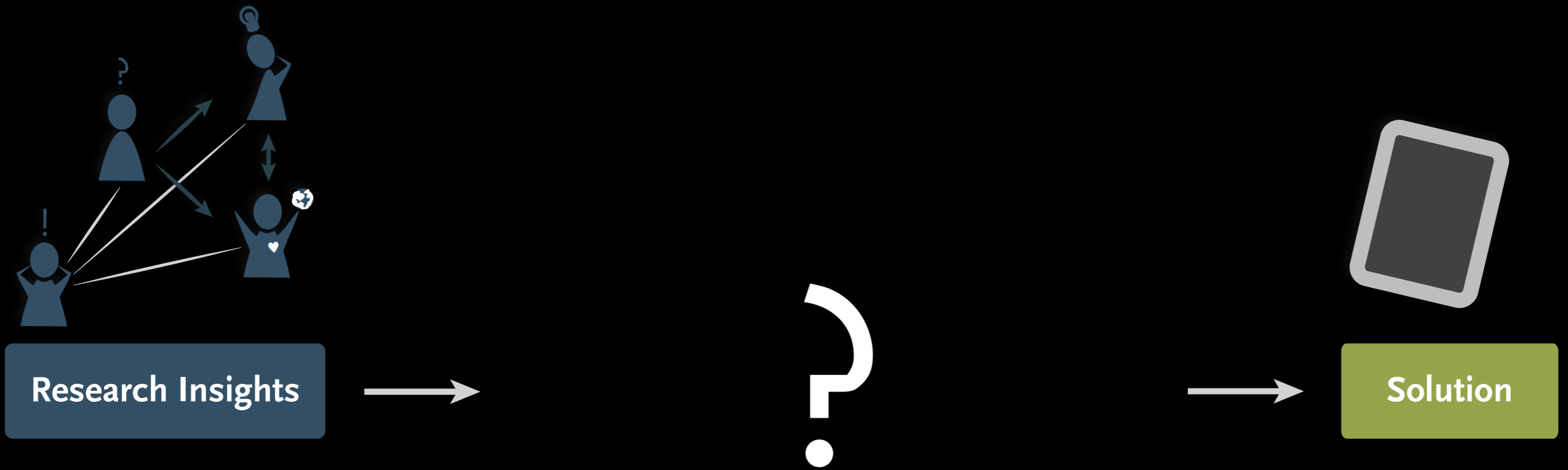
Resupply Cargo

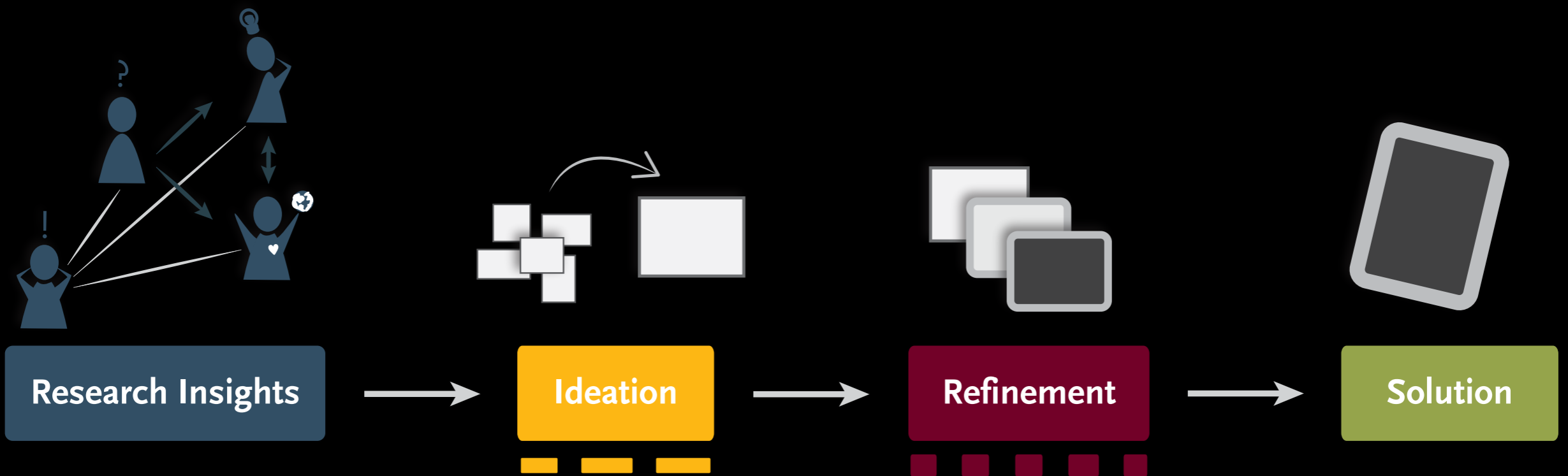
Prepare for End of Day

---

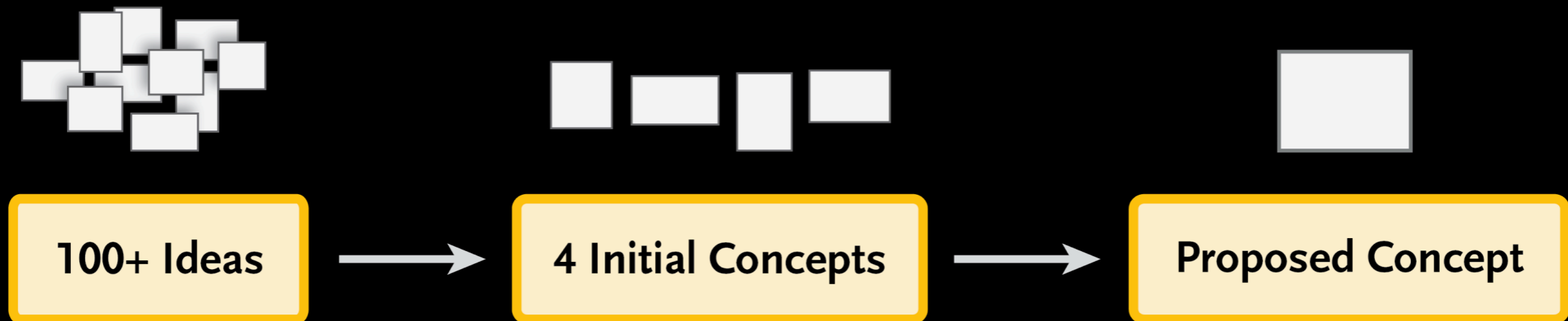
3

# Process

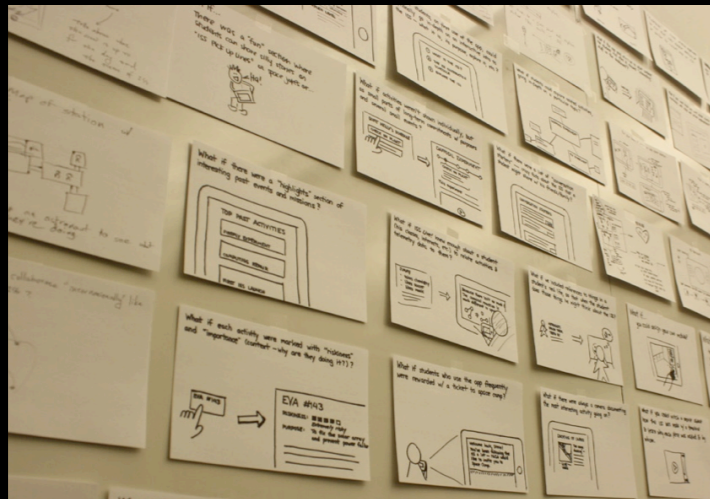
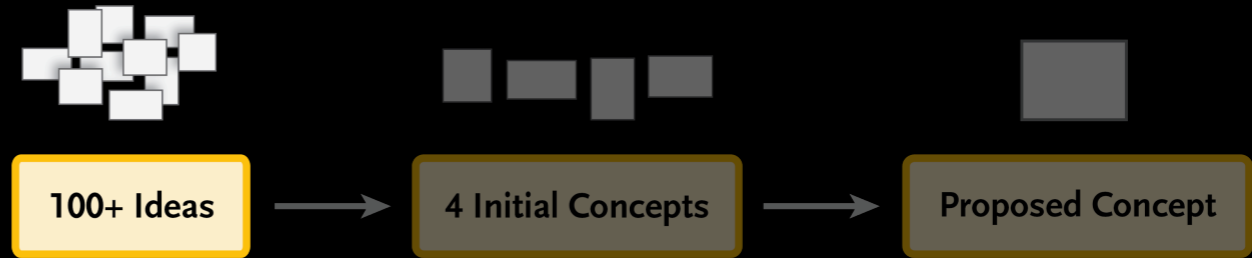




# Idea Generation



# 100+ Ideas



## Rapid Brainstorming

Numerous rough ideas



## Persona-Based Design Studio

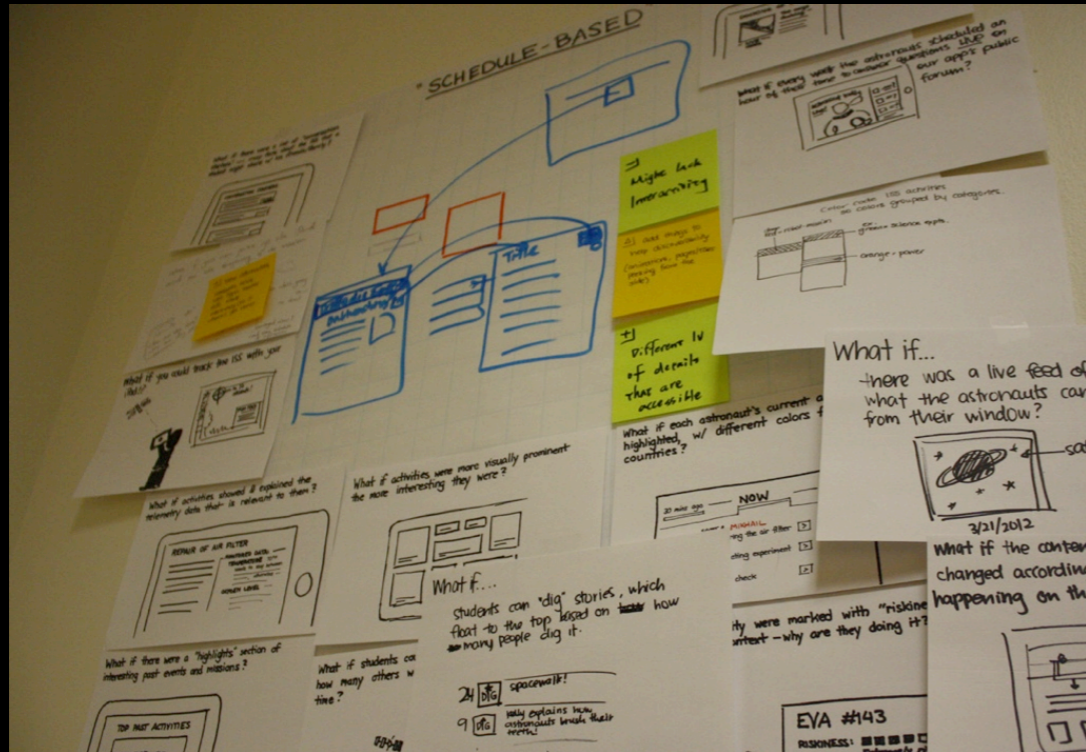
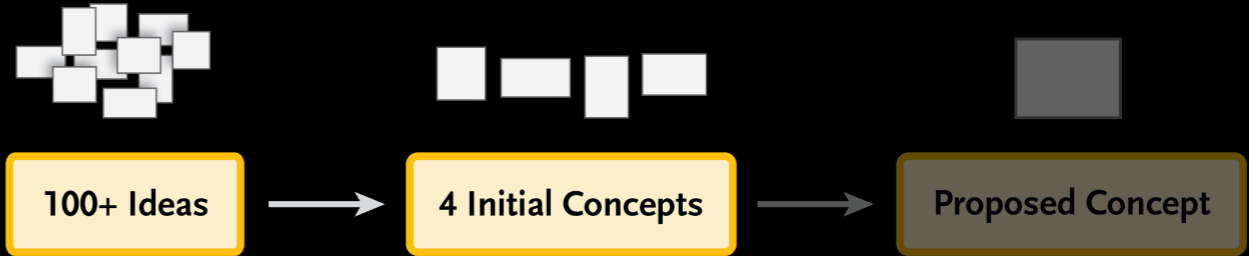
Persona-driven ideas



## Brainwalking

Fleshed-out ideas

# Analysis & Selection



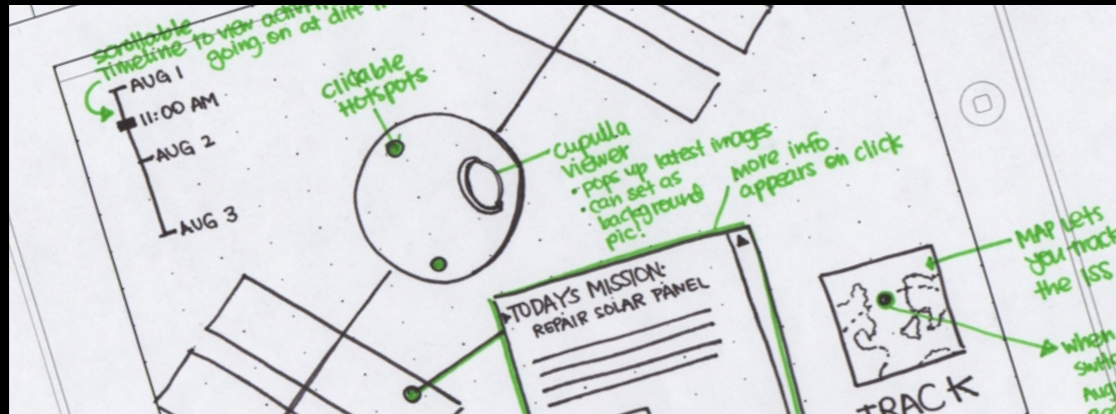
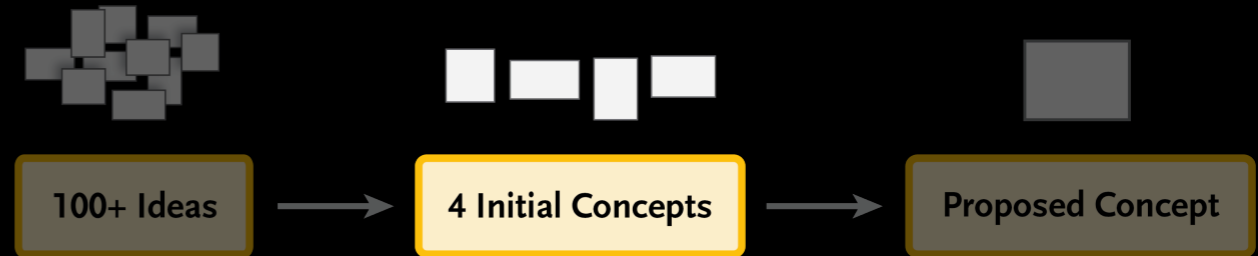
## 1. Idea Affinity

Group together similar ideas

## 2. Three Criterion Evaluation

“I Wish” / “I Like” / “Design Ideas”

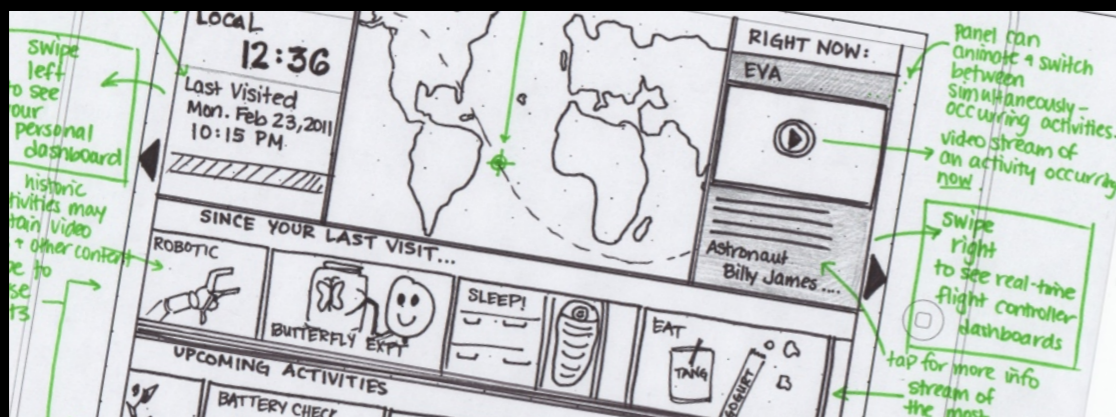
# Initial Concepts



## 3D Model & Hotspots



## Sensor Dashboard



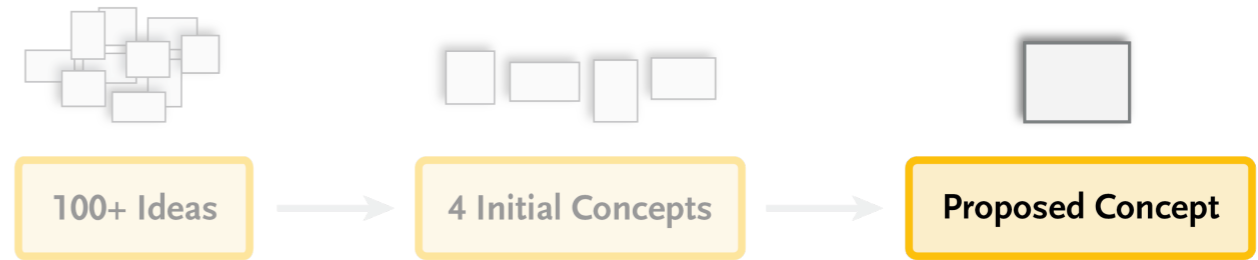
## Mission Control View



## Activity Collage



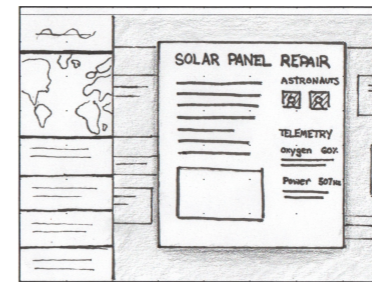
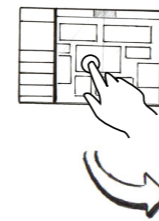
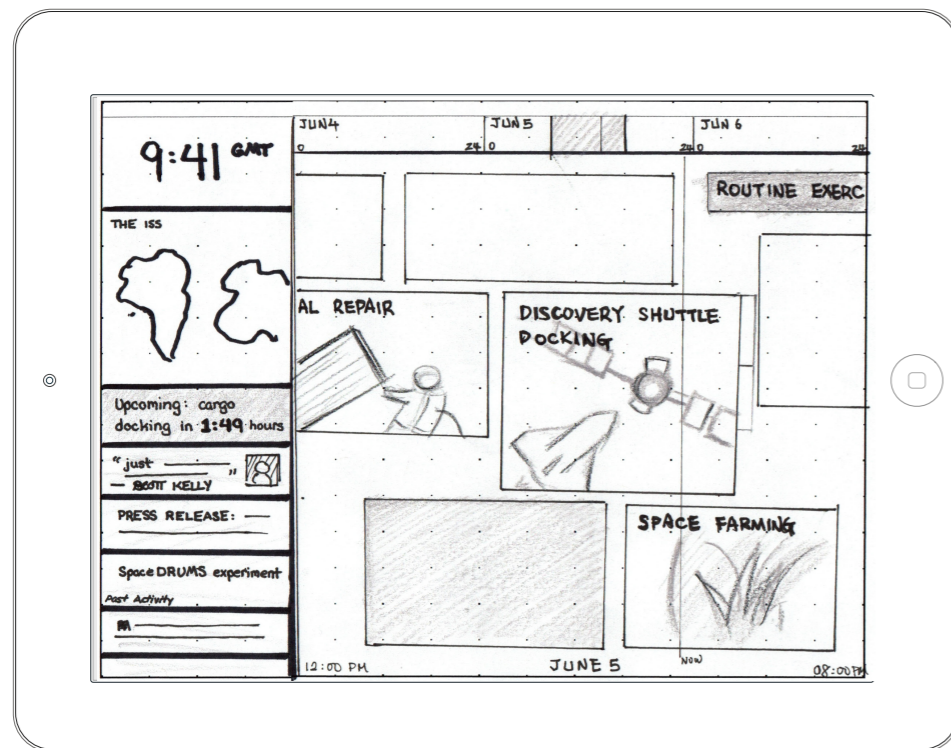
# Proposed Concept



## ISS Watch

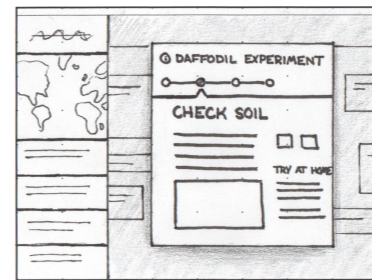
Monitor the Station in Real-time

ISS Watch is an iPad application that provides real-time information about the ISS in a dynamic, scientific, and public-friendly way. It differs from other space-related educational resources because it focuses on the ISS and presents real data in the context of greater applications. The timeline visualizes scheduled activities, sizing them based on appeal. The left panel includes a live map tracking the station and a personalized feed that can present countdowns to significant events, press releases, ISS articles, and tweets from astronauts.



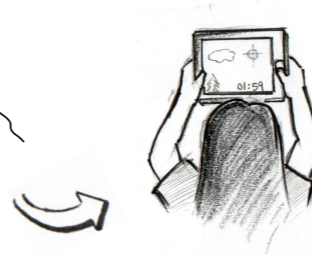
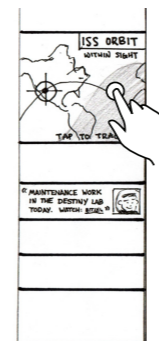
Tapping an activity in the timeline reveals details, including a description, information about the astronauts working on it, and any relevant telemetry.

**Steve** has always been interested in space, and he jumped at the chance to download *ISS Watch* because it would allow him to see what activities the astronauts are performing on the space station. He loves reading the real-time telemetry to learn more about how the values change and the impact it has on the station. This application helps him feel more in tune with the ISS. Furthermore, he also finds himself using the Event Countdown to keep track of the more exciting events coming up.



Activities that are parts of extended projects display information about the greater project. Additionally, science experiments include "Try At Home" versions that allow students to understand the greater purpose of activities.

**Faith** is always looking for new applications that would help her learn more about science. She stumbled upon *ISS Watch* and has been a fan ever since. It isn't as overwhelming as other educational applications because it enlarges the more popular activities that may be more interesting for her, and it explains the experiments in more detail.



The map leads to an augmented reality feature that guides the user in tracking the ISS. When the ISS is within viewing distance from the user's location, the tracking icon pulsates on the map.

**Taylor** heard about *ISS Watch* through her friends at school. Her favorite part of the app is the left panel because she can read tweets from astronauts and news stories about their activities and missions in space. The ISS Tracker tool was particularly interesting for her because she never realized that she would be able to view the ISS from her home. She logs in periodically to see when the ISS will be in viewing distance.

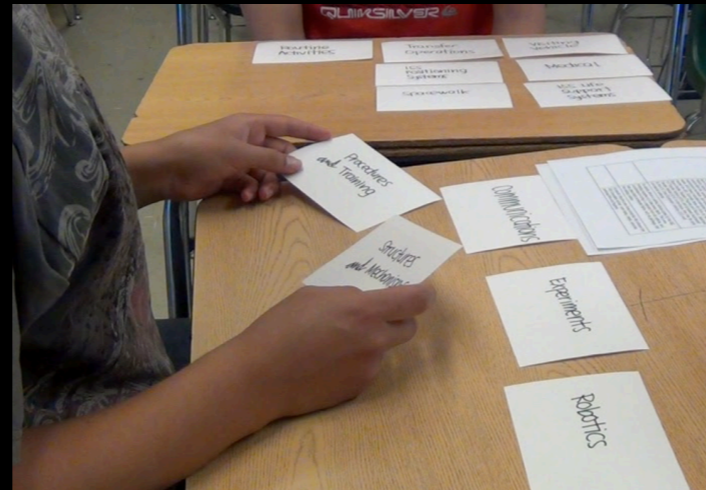


# Evaluation Methods



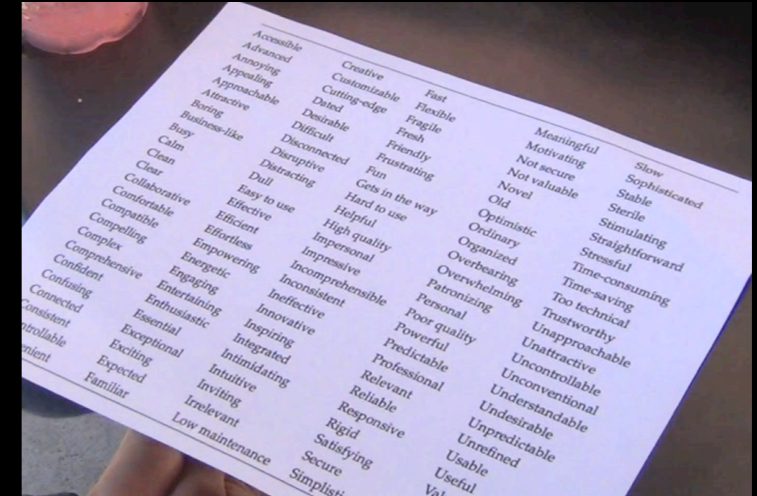
## Usability

Think-Aloud w/ Probing  
Paper Prototyping on iPad



## Comprehension

Comprehension Questions  
Card Sorting



## Desirability

60-Second Commercial  
Product Reaction Words

# Five Iterations, Increasing Fidelity



Photo Space Biotechnology

Personal Time Before Going To Sleep

Personal Time Before Going To Sleep

UPCOMING EVENT (3:00pm Tuesday)  
Chat with NASA about implications of newly discovered black holes.

The Next Day's work

Test Reaction

Check Biological Research

PRESS RELEASE  
A Big Surprise from the Edge of the Solar System

PRESS RELEASE  
Aquarius Launches to Survey Earth's Salty Sea

Personal Time Before Going To Sleep

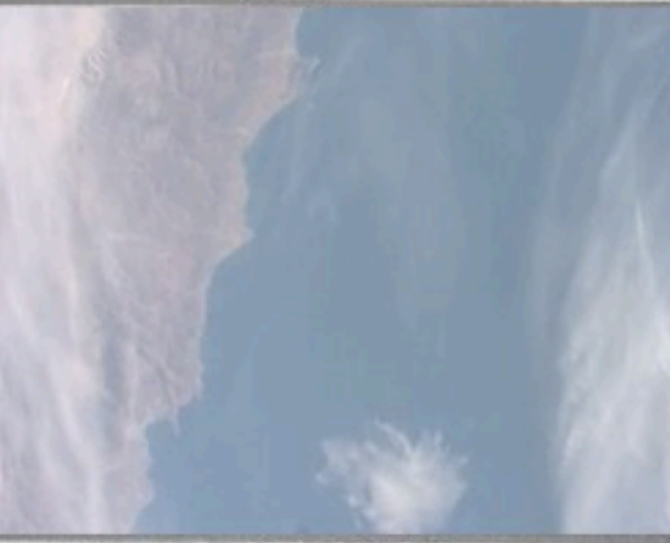
TWITTER (from astronaut Ronald Garan)  
<http://bit.ly/j1U9yf> Come Aboard the #ISS! My 1st Video Blog Post #FromSpace Hope you enjoy!

Try Spacesuit

Personal Time Before Going To Sleep

PRESS RELEASE  
ISS Finishes the Sphero experiment

# Five Iterations, Increasing Fidelity



UPCOMING EVENT (3:00pm Tuesday)  
Chat with NASA about implications of newly discovered black holes.

PRESS RELEASE  
A Big Surprise from the Edge of the Solar System

TOP TWEET (from astronaut Ronald Garan)  
<http://bit.ly/j1U9yf> Come Aboard the #ISS! 1st Video Blog Post #FromSpace Hope you enjoy!

PRESS RELEASE  
Aquarius Launches to Survey Earth's Salty Sea

8:00am  
3:00am PST

Video Hour Setup  
Laboratory Modules

Prepare For The  
Day's Work

Conference with Family  
And Friends

9:00am  
4:00am PST

Exercise on Exercise Bike  
(US Version)

Environmental Health  
System

Robonaut System  
Unstow & Install

Strength Training  
Exercise

NOW

Psychology Conference  
with Ground Doctors

10:00am  
5:00am PST

Transfer Computerized Inventory

Strength Training Exercise

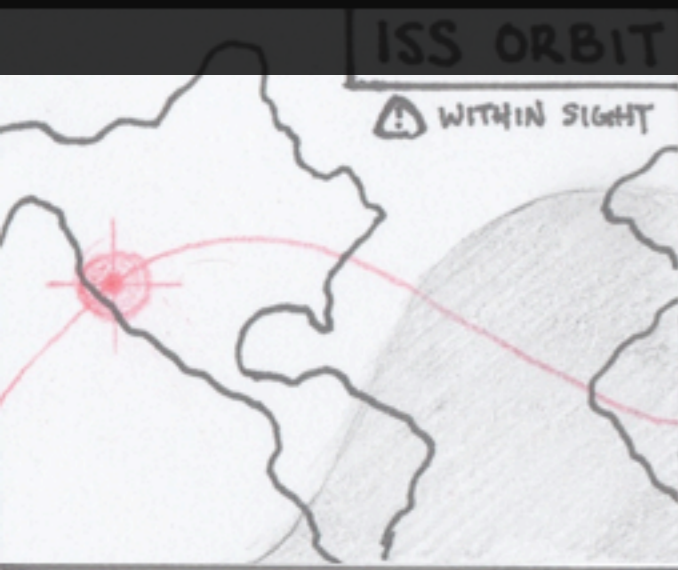
11:00am  
6:00am PST

12:00pm  
7:00am PST

# Five Iterations, Increasing Fidelity

Current Time on the ISS

ISS Time  
Thur. June 30  
12 pm



Strength Training Exercise



1 pm

Close All Window Shutters

Exercise

Run SPHERES Program on Rack 1...

Update Computerized Inventory List

Now ●

2 pm

Check Biological Research

3 pm



4 pm

Psychological Conference With Ground Doctors

External Temperature and Pressure Management Experiment

5 pm

Stow Dry Spacesuit



## Quick Fact:

Over the next few years, there will be 260 spacewalks on the ISS. There have only been 138 in NASA history.

UPCOMING EVENT (3:00pm Tuesday)  
Chat with NASA about implications of newly discovered black holes.

PRESS RELEASE  
A Big Surprise from the Edge of the Solar System

TOP TWEET (from astronaut Ronald Garan)  
<http://bit.ly/j1U9yf> Come Aboard the #ISS! 1st Video Blog Post

Current Time on the ISS 03:27 PM

Thur. June 30

# Five Iterations, Increasing Fidelity

ISS Tracker



ISS Camera



"<http://t.co/U9PxqHj> A story #FromSpace about the spaceship we are all riding through the Universe on together Our @FragileOasis #NASA #ISS"

@Astro\_Ron

NASA Research Offers New Prospect Of Water On Mars

June 30, 2011

"System briefs and weather brief complete. Scattered showers for tomorrow so who knows what will happen. Family time later today."

@Astro\_Sandy

NASA Online Videos Provide New Approach To Teach Science To Public

June 30, 2011

12 pm  
2 pm on ISS

Close All Window Shutters

1 pm  
3 pm on ISS

Exercise

Strength Training Exercise



Run SPHERES Program on Rack 1...

Now

Update Computerized Inventory List

2 pm  
4 pm on ISS

Check Biological Research

3 pm  
5 pm on ISS



4 pm  
6 pm on ISS

Psychological Conference With Ground Doctors

External Temperature and Pressure Management Experiment

5 pm  
7 pm on ISS

Stow Dry Spacesuit



Current Time on the Station 01:15 PM

# Five Iterations, Increasing Fidelity



"http://t.co/U9PxqHj A story #FromSpace about the spaceship we are all riding through the Universe on together Our @FragileOasis #NASA #ISS"

@Astro\_Ron

NASA Research Offers New Prospect Of Water On Mars

June 30, 2011

"System briefs and weather brief complete. Scattered showers for tomorrow so who knows what will happen. Family time later today."

@Astro\_Sandy

NASA Online Videos Provide New Approach To Teach Science To Public

Thur.

Satoshi

Mike

Fin

Andrei Borisenko

Aleksander Samokutyaev

Sergey Volkov

12 pm  
2 pm local

Update Computer Inventory

Exercise on Russian Exercise Bike

Psychological Conference with Ground Doctors

Inventory

1 pm  
3 pm local

Close All Window Shutters

Unload Payload for Resupply

Test Air Filtering Systems

Strength Training Exercise

Now

Exercise

Unstow Dry Spacesuit

Check Biological Research

Exercise on Russian Exercise Bike

Resupply Cargo

Unstow Dry Spacesuit

2 pm  
4 pm local

3 pm  
5 pm local

Resupply Cargo

Medical Test

Update Computer Inventory

Run SPHERES Program on Rack 4

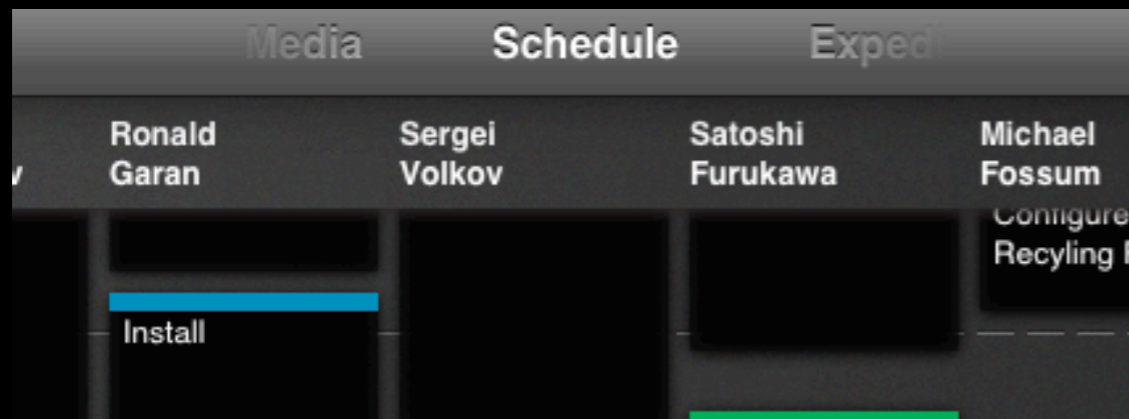
Prepare For End of Day Work

4 pm  
6 pm local

Prepare for End of Day Work

Run SPHERES Program on Rack 1

# Selected Changes



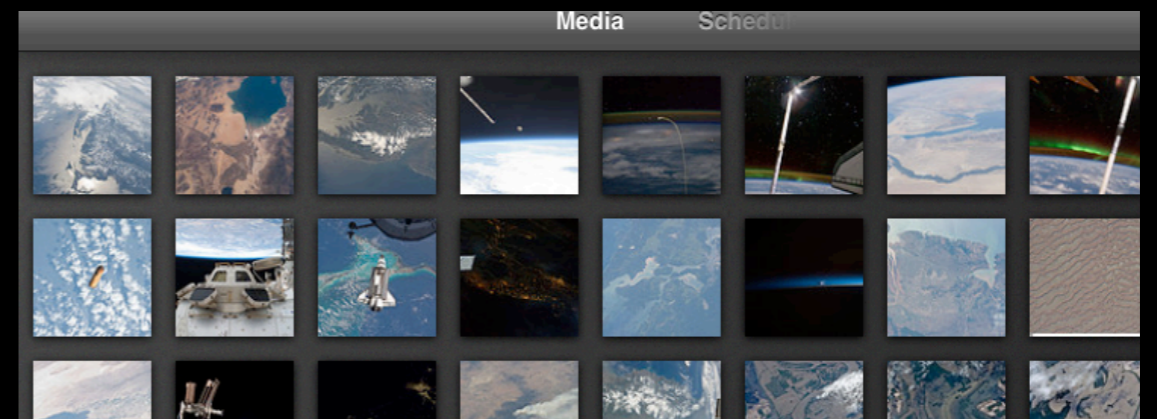
1. Engaging Navigation



2. Schedule Comprehension



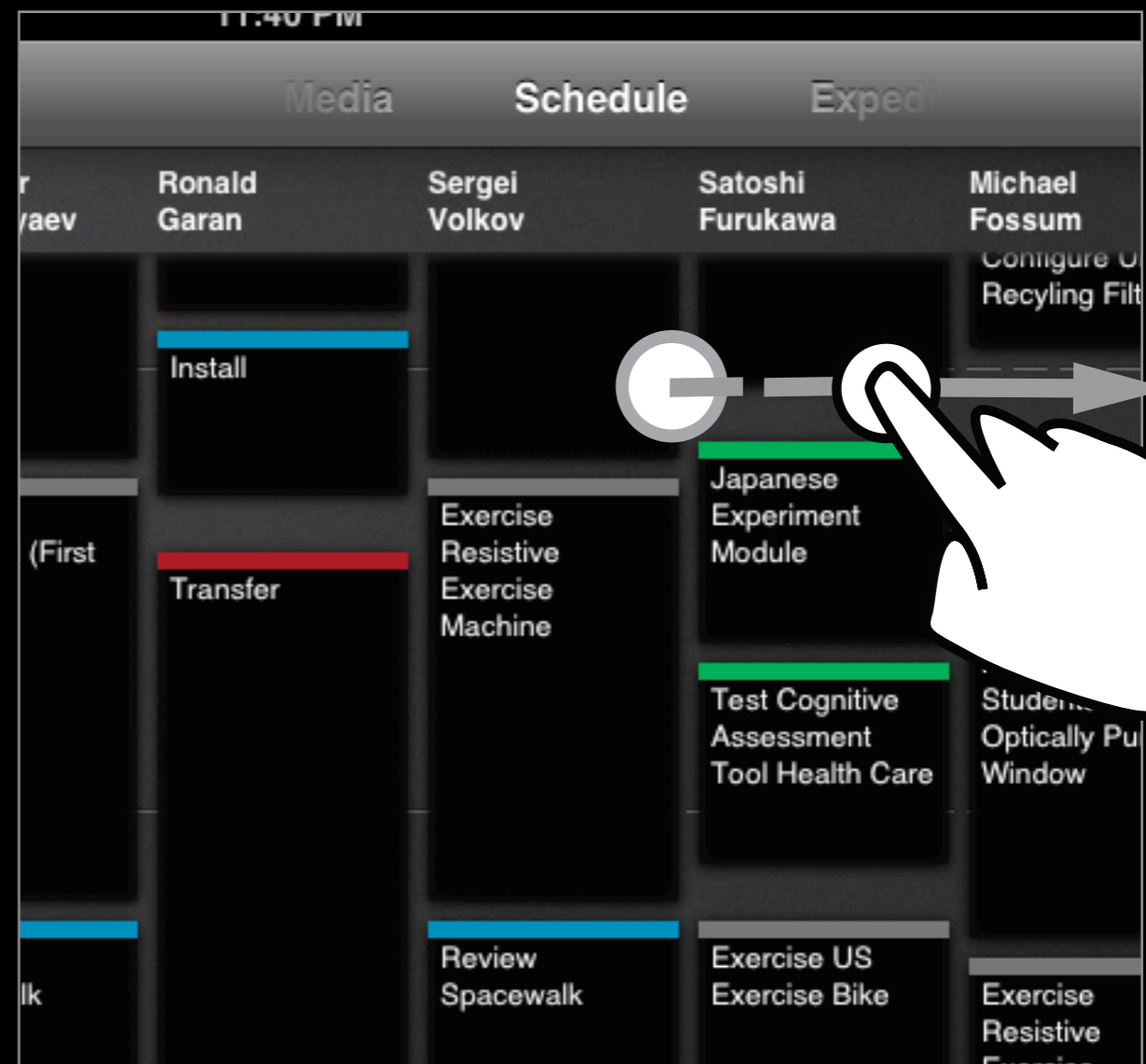
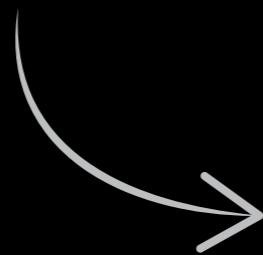
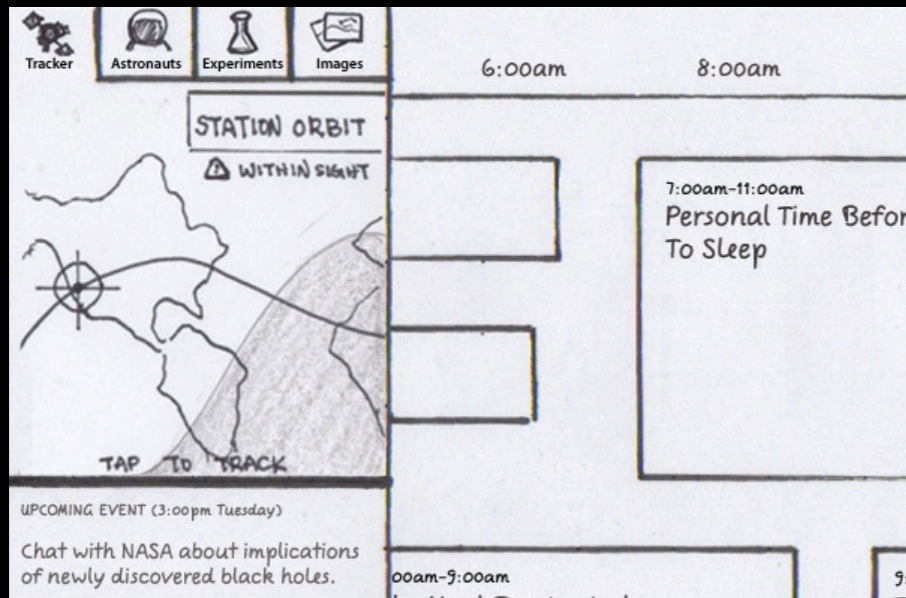
3. Real-Time Feeling



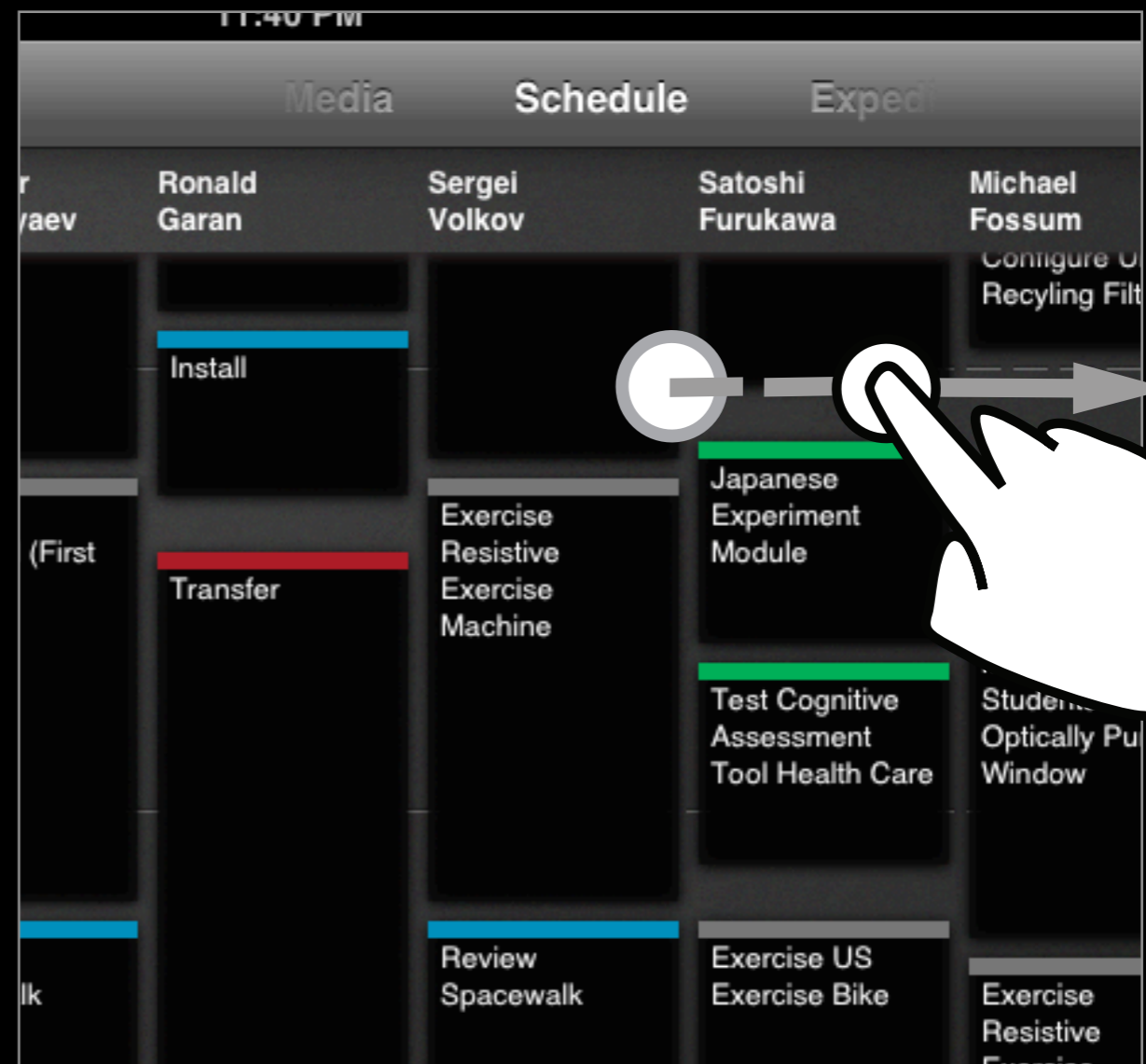
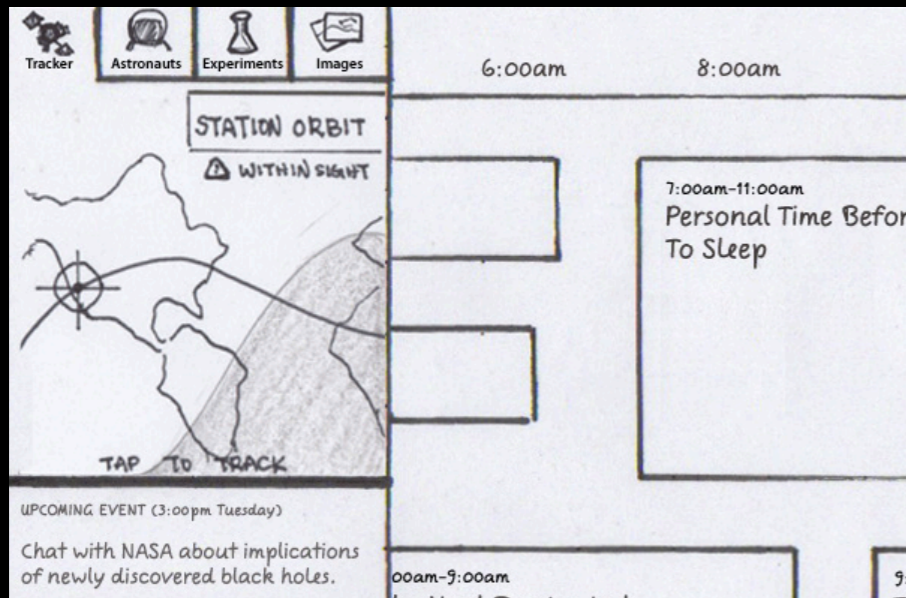
4. More Visuals



# 1. Improving Navigation



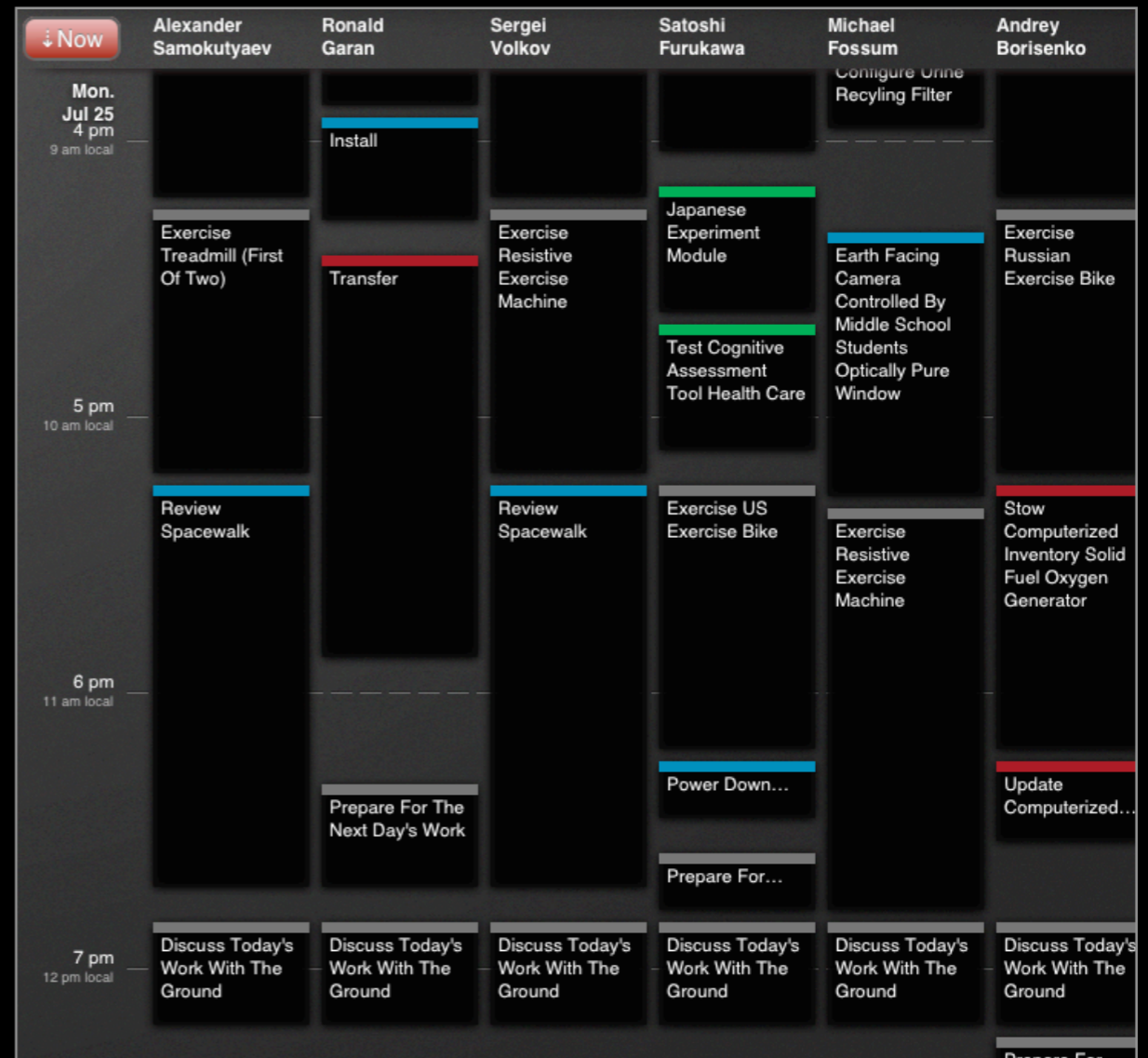
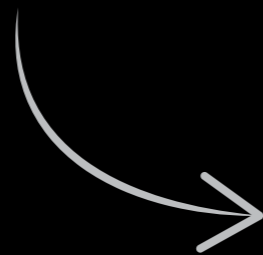
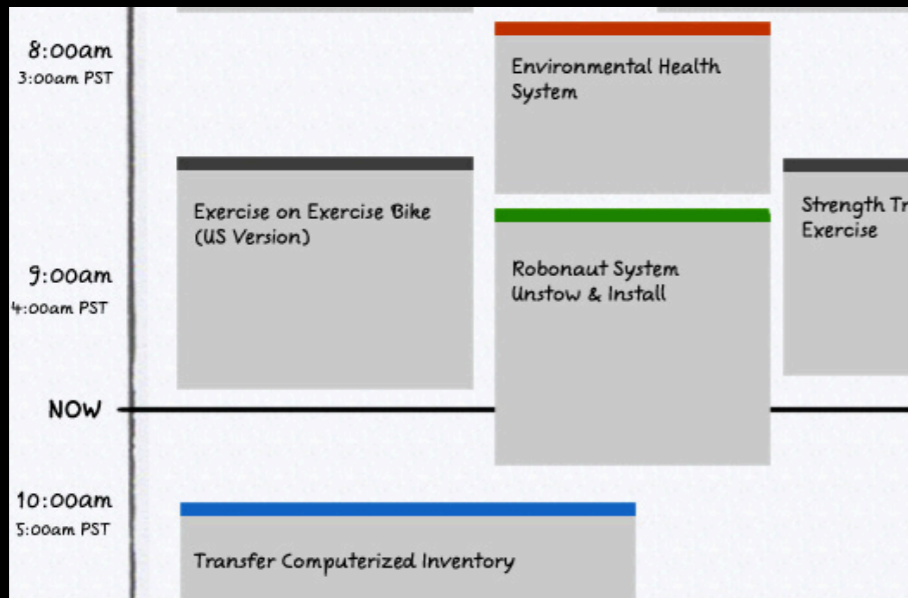
# 1. Improving Navigation



**Possible Future Direction:** the ability to zoom in and out of the timeline.

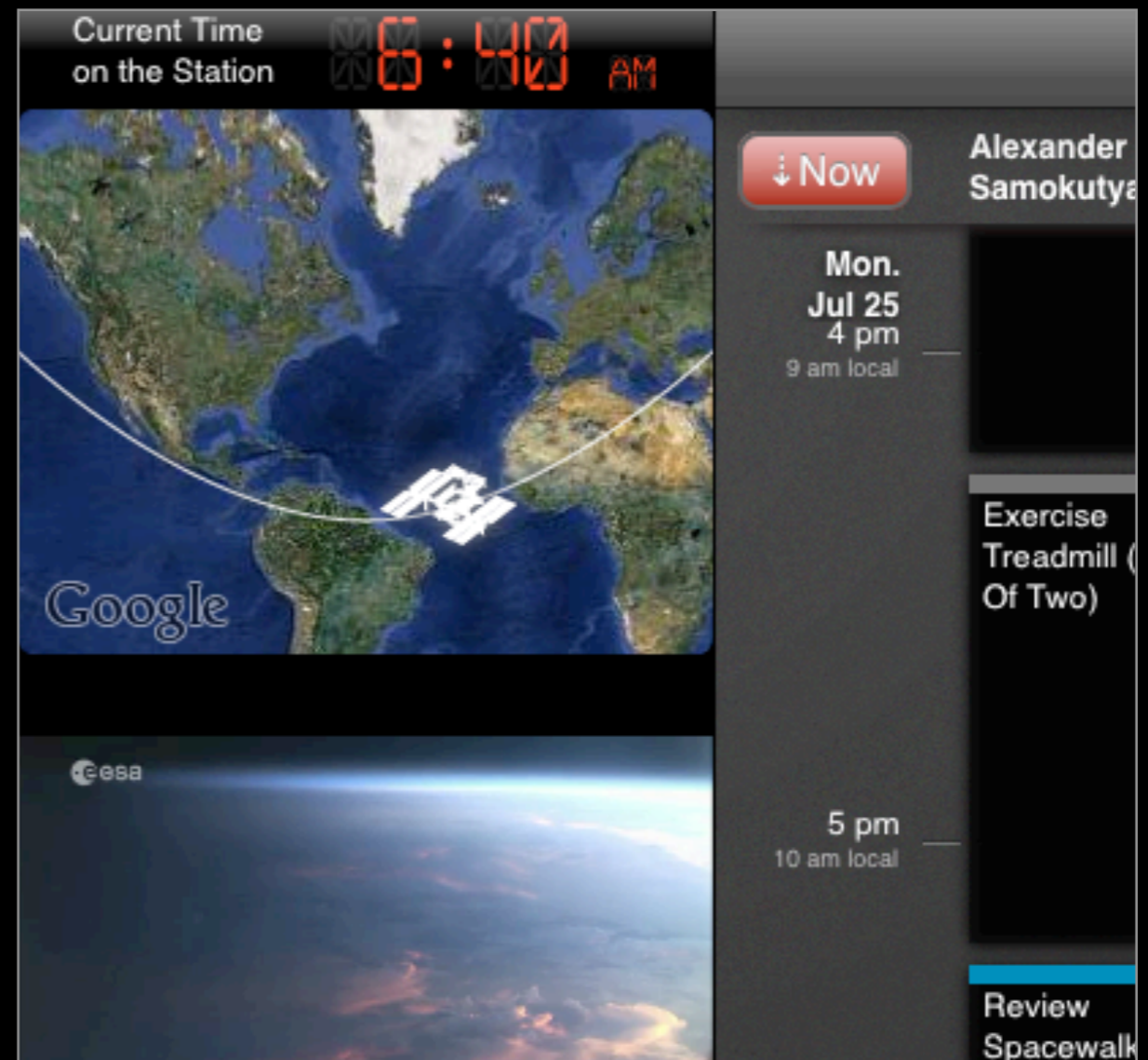
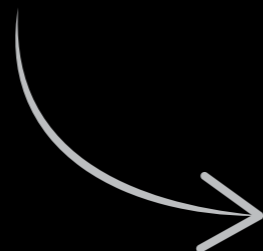
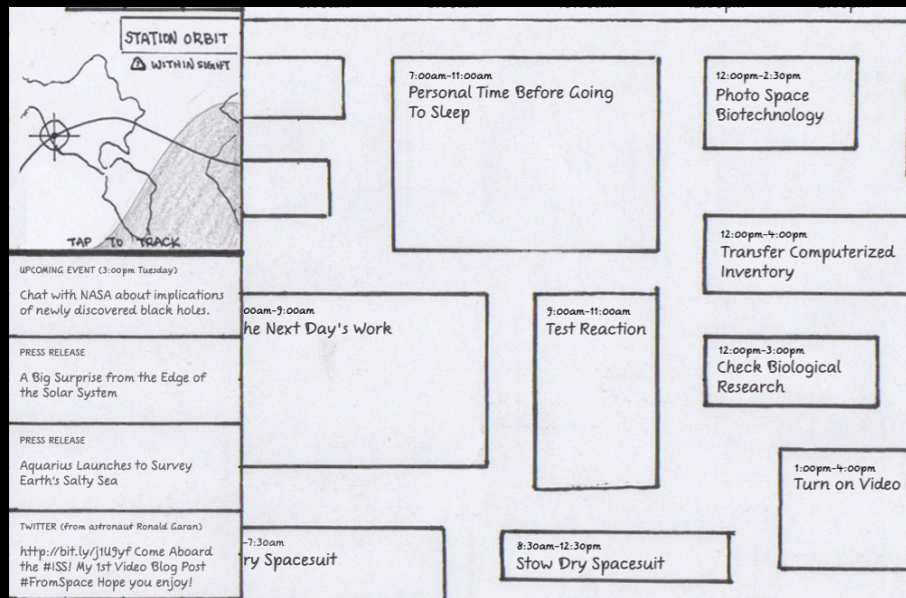


## 2. Improving Schedule Comprehension

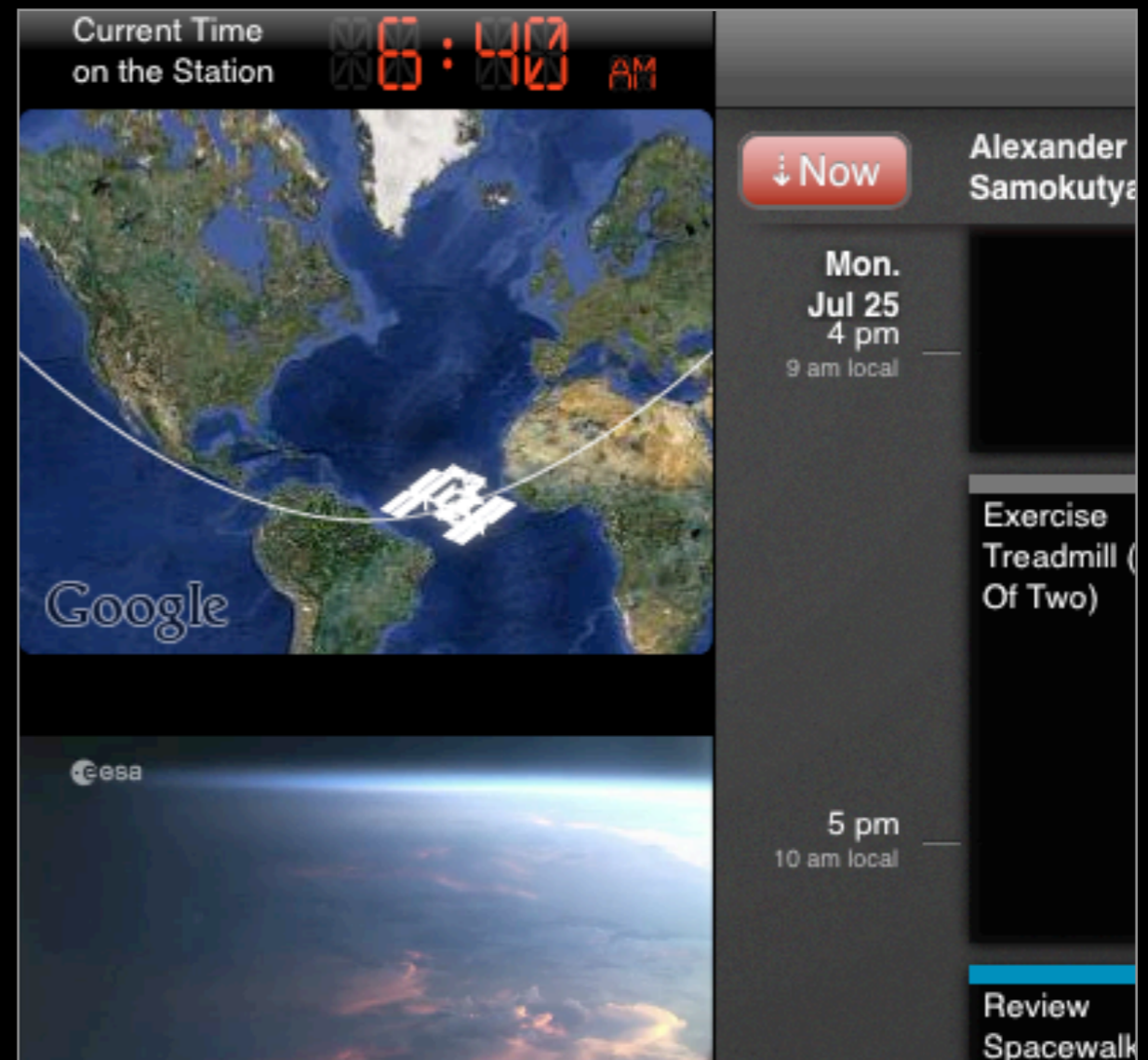
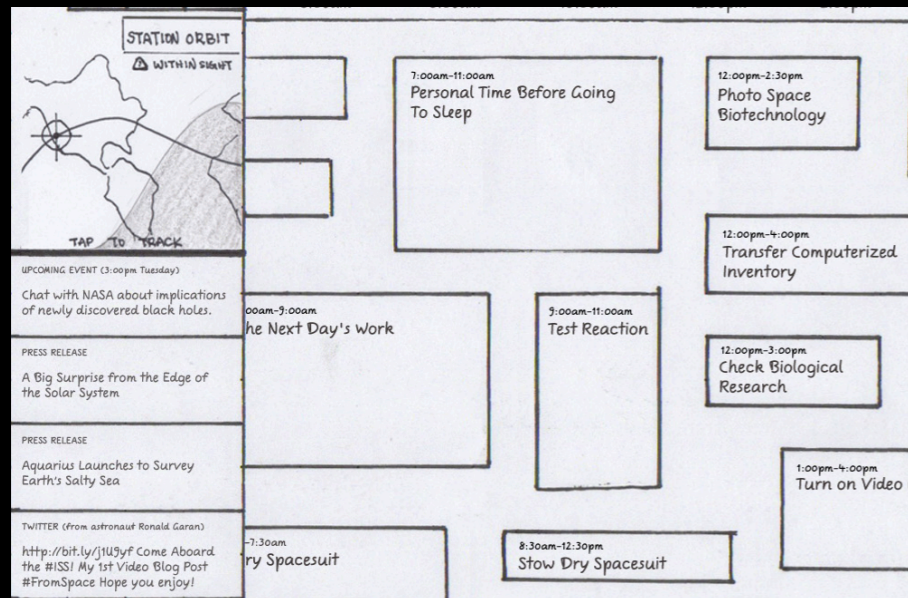


**Possible Future Direction:** truncate the sleep activity, improve category names.

# 3. Making It Feel More Real-Time



# 3. Making It Feel More Real-Time



**Possible Future Direction:** augmented reality ISS tracker, telemetry integration.

# 4. Improving Desirability Through Visuals

*“Would you guys have photos of that too?... Yeah that would be cool. I think people would be interested in that.”*

– Jackie, high school student

*“Maybe more pictures? Like if i clicked on the exercise on treadmill...maybe seeing a picture of that... or video?”*

– Ashley, high school student



The collage features several key elements:

- Grid of 20 Images:** A 4x5 grid of small images showing various space-related scenes, including astronauts, spacecraft, and Earth from space.
- Large Image:** A prominent image of the International Space Station (ISS) in orbit, with the ESA logo visible.
- Crew List:** A vertical list of crew members with their names and roles:
  - Andrei Borisenko, Station Commander
  - A. Samokutyayev, Flight Engineer #1
  - Ron Garan, Flight Engineer #2
  - Sergey Volkov, Flight Engineer #3
  - Mike Fossum, Flight Engineer #4
  - Satoshi Furukawa, Flight Engineer #5
- Thematic Labels:** Several labels are placed over the images, such as "Robonaut", "Massive Heat Transfer", "Spiders & Fruit Flies", "Spiders & Butterflies", "Liquid Plasma Crystals", "ISS Ham Radio", "Treadmill Kinetics", and "Cardiovascular Effects of Space".

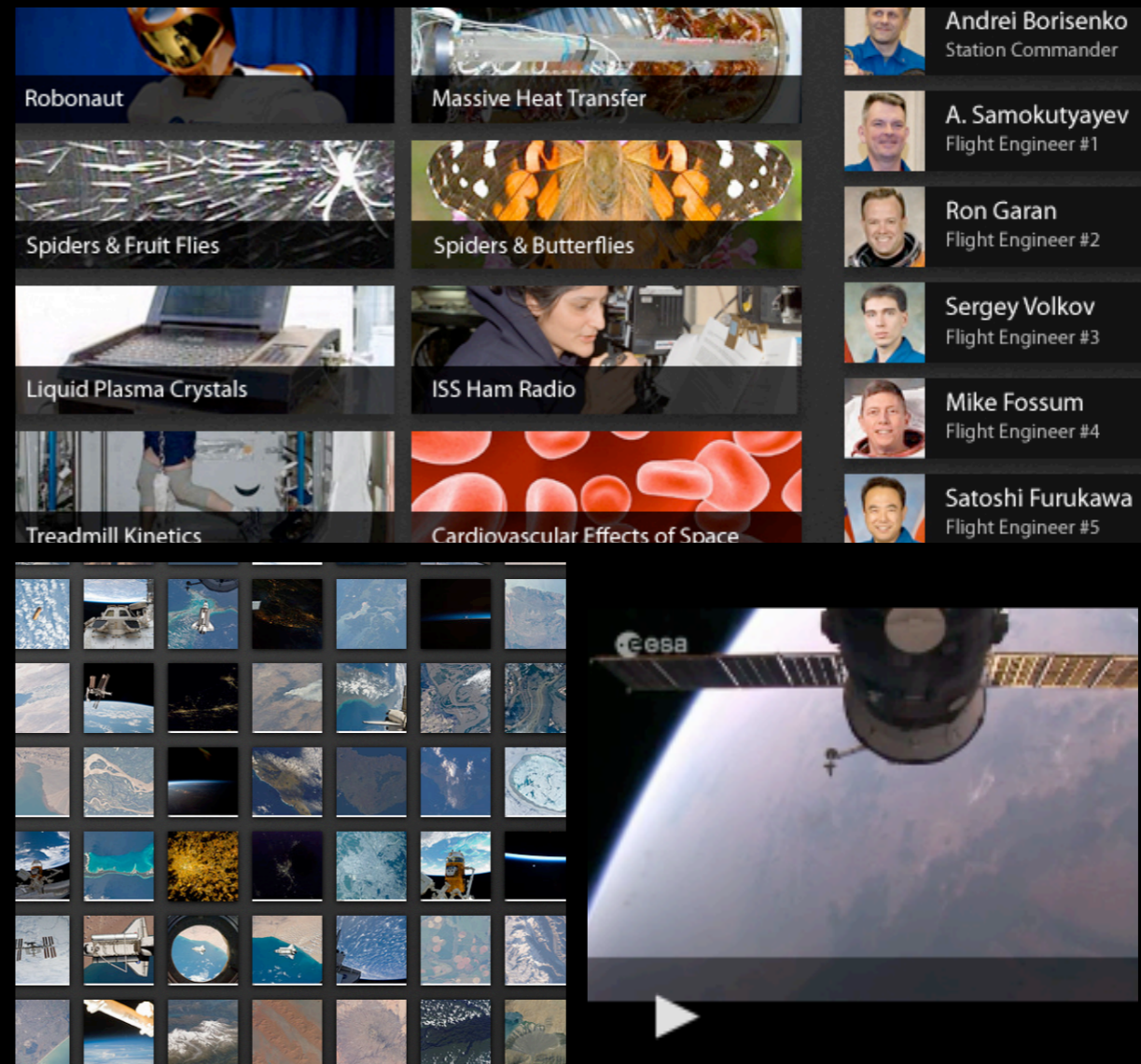
# 4. Improving Desirability Through Visuals

*“Would you guys have photos of that too?... Yeah that would be cool. I think people would be interested in that.”*

– Jackie, high school student

*“Maybe more pictures? Like if i clicked on the exercise on treadmill...maybe seeing a picture of that... or video?”*

– Ashley, high school student



**Possible Future Direction:** more images for astronaut activities, have interesting media for each featured experiments.



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4

# Conclusion

# *Signals of Success*

# *Signals of Success*

Student feedback evolved from interface troubles to curiosity and a desire for more.

# Next Steps and Maintenance

1. FEATURED EXPERIMENTS
2. UPDATED ASTRONAUT BIOS
3. ACTIVITY DESCRIPTIONS
4. PUBLICIZING

The screenshot displays the ISS Watch website interface. At the top left, it shows the current time on the ISS as 05:15 AM. Below this is an ISS Tracker map and an ISS Camera feed. The main content area features a section for Expedition 28, which is active from May 2011 to September 2011. A brief description of the ISS and the current expedition is provided. To the right, there is a grid of featured experiments including Robonaut, Massive Heat Transfer, Spiders & Fruit Flies, Spiders & Butterflies, Liquid Plasma Crystals, ISS Ham Radio, Treadmill Kinetics, Cardiovascular Effects of Space, SPHERES, and Kids in Microgravity. On the far right, the Expedition Crew is listed with portraits of Samokutyaev, Borisenko, Fossum, Garan, Volkov, and Furukawa. A sidebar on the left contains social media updates and news articles, such as 'NASA Research Offers New Prospect Of Water On Mars' and 'NASA Online Videos Provide New Approach To Teach Science To Public'.

## *Future Research*

WHO IS USING THE APPLICATION?

WHAT ARE THEY USING THE APPLICATION FOR?

HOW CAN IT IMPROVE?

HOW EFFECTIVE IS THE APPLICATION?

CAN WE REACH A BROADER AUDIENCE?

# *Future Directions*

1. TELEMETRY INTEGRATION
2. PAST EXPEDITIONS INTEGRATION
3. AUGMENTED REALITY VIEW FOR ISS TRACKING
4. DO-IT-AT-HOME VERSIONS OF EXPERIMENTS
5. AND MORE! (CHECK OUT OUR REPORT)

# ***Feedback Video***



# Q&A





# Background Research

# Background Research

## LITERATURE REVIEW

37 ARTICLES, TALKS, AND BOOKS

*Connect new knowledge to prior knowledge.*

*Better Integration of education and entertainment.*

## COMPETITIVE ANALYSIS

5 SPACE AND SCIENCE IPAD APPS

*Cool interaction is key.*

*Immediate engagement is crucial.*

Tony's space book pics



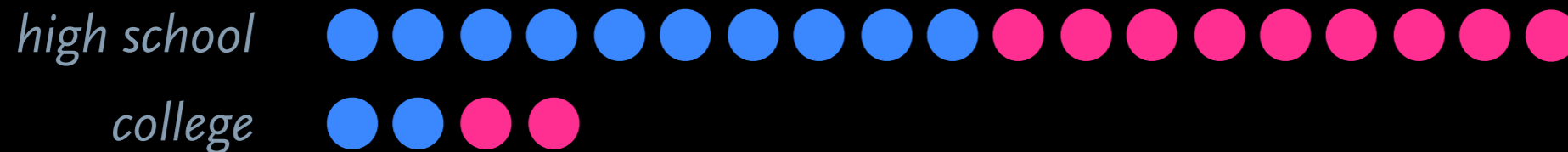
# Research Demographics

# Field Research Demographics

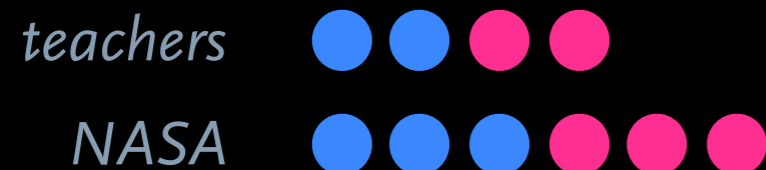
## 13 FLIGHT CONTROLLERS



## 23 STUDENTS



## 10 EDUCATORS



## 7 SPACE ENTHUSIASTS



53

TOTAL



# Research Methods

# Flight Controllers

## CONTEXTUAL OBSERVATION

*observe the practice of flight controllers using scheduling systems.*

## ACTIVITY AFFINITY

*understand which ISS activities happen most frequently and which are most exciting.*

## INTERVIEWS

*uncover the reasons behind flight controllers' passions for space.*

# Educators

## CLASSROOM OBSERVATION

*learn how teachers interact with the students to communicate technical information*

## INTERVIEW

*further understanding of what methods worked*



# Students

**POSTCARD DRAWING ACTIVITY**  
*discover what students know about space.*

**BACKGROUND INTERVIEWS**  
*learn how they use smartphones/schedules, and talk about their interest in space.*

**CARD ACTIVITIES**  
*understand what's interesting to students about space and their daily activities/classes.*

**CONTEXTUAL THINKALOUDS**  
*uncover how students discover new educational applications and evaluate their usefulness.*





# Insights



# Usage Scenario