

# Mission: Bringing it Home



STS-107

Mission Activities for Better Lives on  
Earth and in Space

Draft Outline, June 2000

# STS-107 Mission Bringing It Home on CD-ROM

- Futron will develop and produce an interactive CD-ROM composed of information capsules which will highlight space and life sciences.

## Advantages

Product targets multiple audiences  
Cost-effective  
Compatible with HEDS tower exhibit

## Audiences

-General Public  
-Media  
Congress and other decision makers  
Educators  
NASA Scientists



# Product Infrastructure



- Vehicle: video-based infrastructure will allow viewers to:
  - gain an overview of the STS-107 mission (including crew bios, training, selected investigations, science overview, and PI bios and interviews)
  - launch from the video into interactive segments highlighting STS-107 experiments as they benefit the general population



# Mission Bringing It Home

- The theme throughout on the CD will be exploring how NASA work benefits life on Earth, as illustrated through life sciences and microgravity activities planned for STS-107. These links from the mission overview will explore how the work of the crew and PI's translates into improvements in our daily life.

## Navigation Bar

### –Vehicle

–History

–Flythrough

–Cockpit

–Middeck

–SpaceHab DM

–Cargo Bay

### –Crew

–Individuals

–Bios

–A Day in the

–Life of

–Commander/MS

–Pilot/PS

–Video Footage

–Training

### –Cargo

–Triana

–MEIDEX

# Segment 1

## Video Opens: Shuttle Launch

Narration: Long before the launch date scientists, flight planners, engineers and crew members must begin working to make sure the flight's defined goals are met. Many people are involved the complex undertaking of each space flight.



Vehicle

Crew

Earth  
Benefits

Payload

Cargo

Crew  
Benefits

# Crewmember Bio



*official portrait of crewmember*

**Brief Bio Sketch** (if possible, narrated by astronaut--"Hi, I'm xxx. I was born...")

Birthdate/place

Education

Space flight experience

Personal information (family, hobbies, Interests, etc.)

## A Day in the Life of (Commander/Pilot/MS/PS)

*links to one of 4 pages (depending on position) with video and narration (pref. of 107 crewmember during training) of what duties each position performs*

## VIDEO FOOTAGE

May include interview with crewmember ("Why did you become an astronaut?", e.g.), footage of crew member in training, conducting research, with family, etc..



# Location Information

Each location (Cockpit, MidDeck, SpaceHab, CargoBay) will be linked to a page such as the ones listed below. Each page will contain the following information, links, and sublinks:

## Cockpit

- Specs (dimension, special capabilities, etc.)
  - Additional link to new cockpit information

## MidDeck

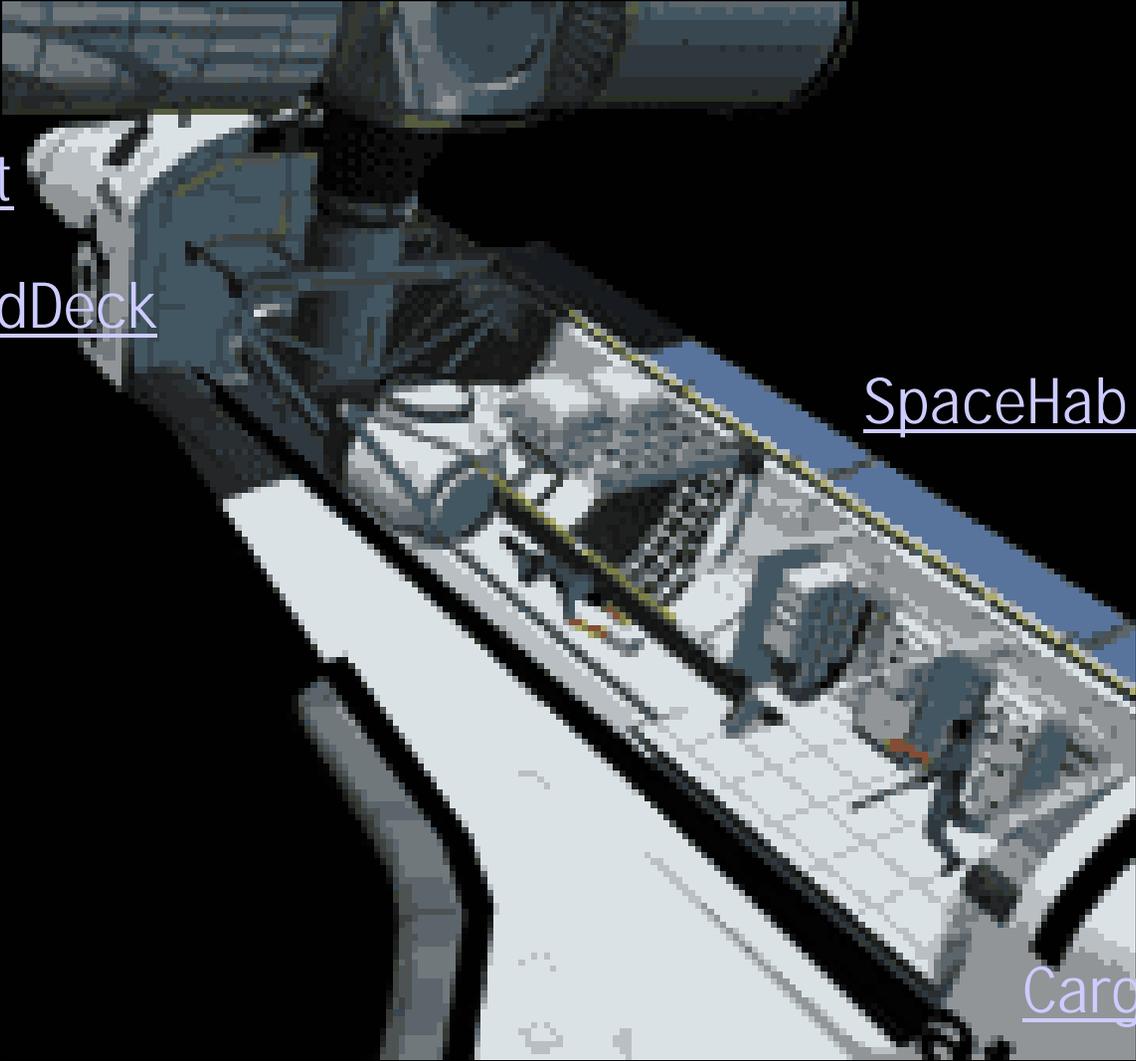
- Specs (dimension, special capabilities, etc.)
  - What the MidDeck is used for
- Previous research conducted on MidDeck

## SpaceHab

- Specs (dimension, special capabilities, etc.)
  - What is SpaceHab used for?
  - Link to SpaceHab.com
- Previous SpaceHab flights
  - Previous SpaceHab lab research conducted & benefits from that research

## Cargo Bay

- Specs (dimension, special capabilities, etc.)
  - Fun facts (e.g., cargo bay must be open on orbit to dissipate heat)
- What the cargo bay is used for
  - How a satellite is launched (video) from cargo bay



Cockpit

MidDeck

SpaceHab DM

Cargo Bay

“Flyover/flythrough” of a Shuttle accompanied by voice-over. During the flyover, the VO explains that STS-107 is a research flight bridging the Shuttle program and ISS utilization. As the flyover finishes, we go to a “flythrough” tour (VR/Quicktime/Questron?) of the Shuttle, with explanations of each location. Viewers can either click on a location they’re interested in as they get there, or wait until the flythrough is done, be presented with a schematic of the shuttle, and then click in the locations. Each location is linked to a specific topic. Cockpit will take viewers to crew information; middeck will take viewers to experiments, etc.

# Earth Benefits: How STS-107 will lead to an improved quality of life on Earth

- From video of several terrestrial areas which could benefit from the in flight studies, the following areas will be linked to additional information:
  - Cleaning air and water pollution
  - building safer buildings
  - improved fire safety
  - methods to feed the growing population
  - fighting disease



## Navigation Bar

Experiments

–Combustion

–Video

–Methods

–Crew Benefits

–Earth Benefits

–PI Info

–Coastal & Earthquake  
Zones

–Tissue Culture

–Sleep Patterns

–Viruses

–Stress

–Thermoregulation

–Plants & Gravity

–Water Purification

Technology

–Brain Plasticity

–Immune System

Response

–Gene Transfer

–Pharmaceutical

Development

–Water/ion Transport

# Video Segment 2: Space, Earth and People Scenes

Appropriate narrative about how NASA, specifically SLSD, benefit life on Earth through descriptions of the work on 107 affecting the topics below. Also, via the navigation bar to the left, more specific information about selected experiment will be available.

Cleaning Earth	Fight Against Disease	Pumping Iron without Weights
Cleaner Water	Overcoming Osteoporosis	Kidney Stones
Safer Buildings	Healthier Hearts	SAMS-FF-OARE
<u>Fire Safety</u>	Vertigo Treatment	Brain Fluid In Space
Feeding Growing Population	Sleepless Nights	Plants in Space

# Meet the Investigators

## Principal Investigator:

Czeisler, Charles A.

## Co-Investigators:

Dijk, Derk-Jan

Kronauer, Richard

Neri, David

Shanahan, Teresa L.

Shea, Steven

Text/Narration/  
Interviews with  
investigators  
(similar to Crew  
Bios)



# From each topic...

Each topic will hyperlink to a video of an interview with the PI, or video of the topic. For each experiment the following information will be superimposed over the video:

- Title of Experiment
- Title of module of the shuttle involved/name of area in which it is located
- Project manager
- Deputy Project Manager
- Project Scientist
- PI(s)
- Co-investigators

From the experiment information, the user will be able to navigate through two more hyperlinks:  
Methods: explains how exactly the experiment is performed in space  
Benefits: describes the benefit to life on Earth which could potentially come from this line of study, and commercialization possibilities

Methods

Benefits

## **White Paper for Combustion Experiments to be Performed on STS-107 and the Potential Benefits to life on Earth**

Combustion experiments will be performed centered around the Combustion Module-2 (CM-2), a multiple rack combustion facility which acquires optical, sensor, and gas analysis data for three different experiments using eight functional packages. The major studies which will be performed using this facility are an experiment on the laminar soot processes (LSP), structures of flame balls at low-lewis number, and a water mist fire suppression experiment (MIST). The CM-2 facility provides experiment control, containment of the burning material, diagnostics, and uplink/downlink. The unique hardware needed for each experiment will be installed in the combustion chamber. Crewmembers will be involved for the actual burning processes, while the simpler tasks will be handled remotely by ground operators. A similar facility was flown on STS-83 and STS-94.

The purpose of the laminar soot process (LSP) experiment is to gain a better understanding of soot formation, oxidation and radiative properties with pre-mixed flames. The results of this experiment will help us learn to control soot, knowledge imperative to efficient, safe, and clean combustion. On Earth, soot is the dominant source of radiant heat in combustors and unwanted fire. Soot does allow for heat extraction in power plants. However, it also contributes to the reduced durability of jet engines. Soot polluting our environment is responsible for a lifespan reduction of the equivalent of 2 years in 64,000 U.S. residents a year. Similar experiments were flown on STS-83 and STS-84.

The structures of flame balls at low-lewis number will be conducted to fully demonstrate the flame ball theory. Previous experiments flown on STS-83 and STS-94 were too short to get anything but a preliminary reading. One of the main purposes in conducting the experiment is to validate chemical kinetics and computer models. Additionally, the experiment could lead to more fuel-efficient equipment on Earth allowing us to reduce pollution. The increased knowledge of combustion behavior should lead not only to better safety measurement in space flight, but also a deeper understanding of fire in an enclosed space, such as mines.

# Benefits for Long-term Spaceflight

- The following experiments represent some of the areas to be studied to improve medical safety for crew members in long-term spaceflight:



Development of gravity-sensitive plants in microgravity for food and oxygen generation  
Vapor Compression  
Distillation for waste water recycling  
Arterial Remodeling and Functional Adaptation Induced by Microgravity  
The ability of bacteria to infect the body in microgravity  
Changes in sleep patterns  
Sensitivity to anti-fungal drugs

# Video Segment 3: Connecting STS-107 with ISS

- STS-107 will compliment early ISS utilization and ISS assembly flight investigations.
- Increasing impetus to increase knowledge base of results, benefits, and outcomes to make the most of the ISS work planned



Outreach for STS-107 will include information on the mission's ties to ISS by describing:

- Innovative partnership with the media
- Engaging status reports