How can technology be used to push sport forward?

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Exercise Physiology and Countermeasures Project
Astronauts as athletes

- Prepare for event
- Optimize performance
- Reduce Injury Potential
- Prep the body and mind
Philosophy – train the astronaut in order to increase/maintain health prior to, during, and after the mission
Task analysis

- Determine what is necessary to perform the task correctly
Perform research studies to understand performance

- Ground (Lab)
- Microgravity Analog (like the field, but still the lab)
- ISS (Field)
<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
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<tbody>
<tr>
<td>• Control</td>
<td>• Acute</td>
</tr>
<tr>
<td>• Instrumentation</td>
<td>• Limitations in performance due to analog</td>
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<tr>
<td>• Time to collect data</td>
<td>• External Validity</td>
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Studies in Field

**Advantage**
- Real environment
- Not limited by time
- Can be repeated

**Disadvantage**
- Instrumentation
- Control
- Expensive
- Case Study vs Large Sample
Technology Used

- Motion Capture
- Force
- Metabolic
- Dynamometer
- Simulation
Examples used at NASA

- ARED Ground Study
- ARED Flight Study
- VO₂ max
- Treadmill Kinematics
Application to Athletics

- Need to find simple ways to measure meaningful performance
- Need to find methods to collect data in difficult situations
- Need to be willing to develop new methods
- Use existing methods
- Use existing instruments in new ways