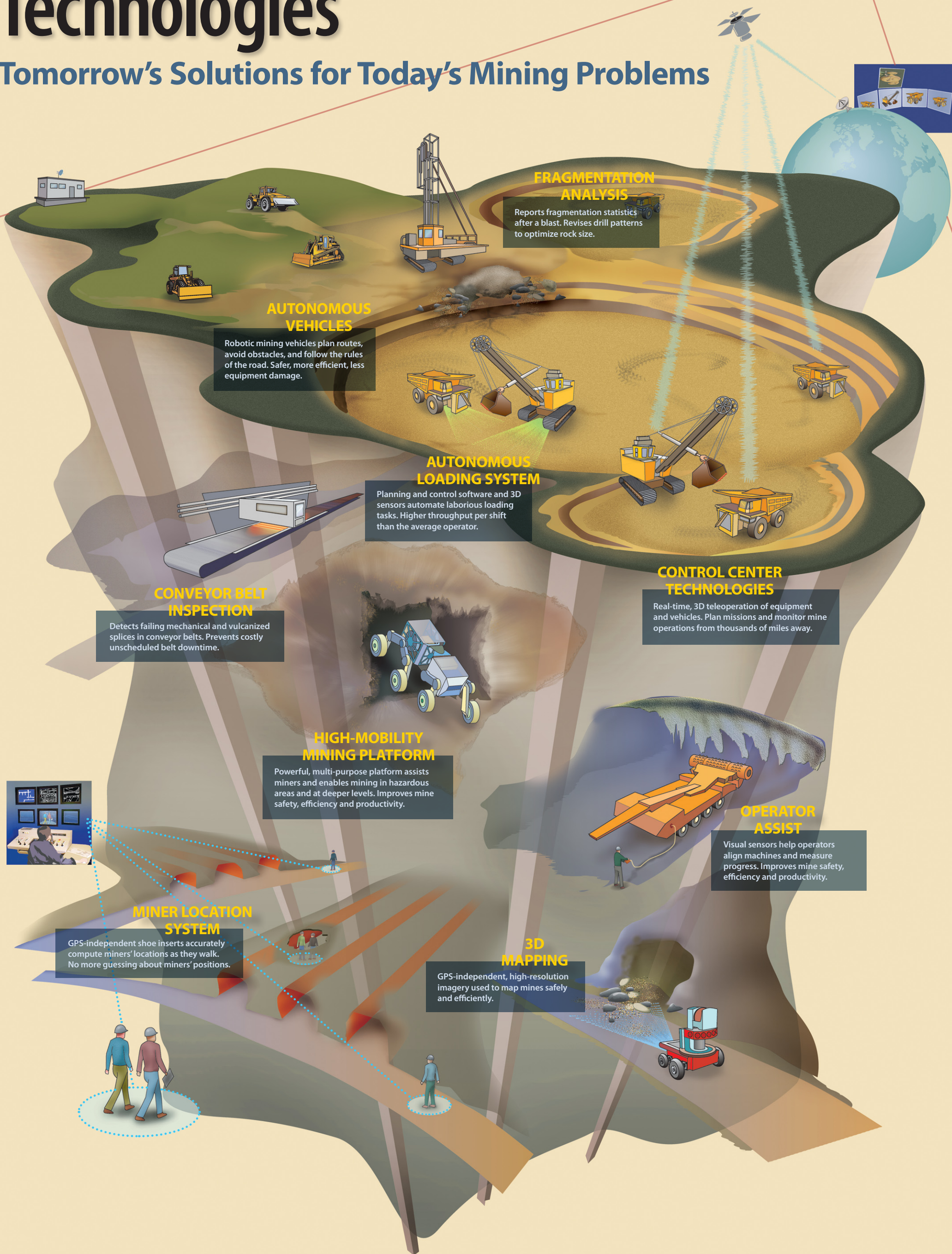


# Robotic Mining Technologies

## Tomorrow's Solutions for Today's Mining Problems

NATIONAL ROBOTICS  
**NREC**  
ENGINEERING CENTER



### FRAGMENTATION ANALYSIS

Reports fragmentation statistics after a blast. Revises drill patterns to optimize rock size.

### AUTONOMOUS VEHICLES

Robotic mining vehicles plan routes, avoid obstacles, and follow the rules of the road. Safer, more efficient, less equipment damage.

### AUTONOMOUS LOADING SYSTEM

Planning and control software and 3D sensors automate laborious loading tasks. Higher throughput per shift than the average operator.

### CONVEYOR BELT INSPECTION

Detects failing mechanical and vulcanized splices in conveyor belts. Prevents costly unscheduled belt downtime.

### CONTROL CENTER TECHNOLOGIES

Real-time, 3D teleoperation of equipment and vehicles. Plan missions and monitor mine operations from thousands of miles away.

### HIGH-MOBILITY MINING PLATFORM

Powerful, multi-purpose platform assists miners and enables mining in hazardous areas and at deeper levels. Improves mine safety, efficiency and productivity.

### OPERATOR ASSIST

Visual sensors help operators align machines and measure progress. Improves mine safety, efficiency and productivity.

### MINER LOCATION SYSTEM

GPS-independent shoe inserts accurately compute miners' locations as they walk. No more guessing about miners' positions.

### 3D MAPPING

GPS-independent, high-resolution imagery used to map mines safely and efficiently.