




**SARCOS™**

Ohio Bureau of Workers Compensation  
March 9, 2018

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### The Leader in Dexterous Robotics for >25 Years

1983	1990s	2007	2015	2018
Univ. of Utah Spin out	Sarcos Robots ca. 1990s	Raytheon Division of Robotics '07-'14	Mgmt. Buyout	




**72** employees, adding 1-3 / week

More than **125** patents for relevant products

**250M+** in technology investments

Leading recipient of **DARPA** funding

Senior engineering team has worked together for **23** years



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### A History of Iconic Innovation

Robotic systems rooted in biomimetics

<b>Prosthetics</b> Including the best selling "Utah Arm"		<b>Humanoids</b> Corporate, Government and Research Customers NASA, DARPA, DoD, Ford, ATR, CMU, USC, Max Planck	
<b>Water Ballet Robots</b> Bellagio Hotel		<b>Jurassic Park Ride</b> Universal Studios 16 Robots produced up to 80,000 lbs.	

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### Human Augmentation Robots with Two Simple Objectives:




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### Guardian™ S

Multi-Purpose Mobile IoT Platform  
*(1<sup>st</sup> Commercial Product post Mgmt Buyout)*

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### Guardian™ S – Multi-Purpose Mobile IoT Platform

Modular sensor platform for inspection, surveillance and non-destructive testing



- IP65/67
- Indoor/outdoor operation
- 3+ mile** battery range
- 12+ hrs** active surveillance
- 360°** video, two-way audio
- Man portable: **16 lbs** + accessories
- 4G, WiFi, Proprietary radio (LOS 1000'+), Fiber optic tether (750')

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**Guardian™ S**

- Industrial Inspection
- Mining
- Construction
- Power/Utilities
- Petrochemical
- Public Safety (bomb squad/SWAT/HA ZMAT)
- Military (EOD/C4ISR)

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**Guardian™ XO®**  
Realizing the Future of Human Potential™

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**A \$100 Billion Annual Problem in the U.S. Alone**



- Lower back pain is *the leading cause of worker absenteeism* after the common cold.
- 25.9 million Americans lost an average of **7.2 days** of work due to back pain
- The average cost of a back injury workers comp claim is **\$40-80k per incident**
- U.S. employers and employees spend **\$100+ billion** annually on back pain related on-the-job injuries



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**The Challenge for the U.S. Industrial Labor Force**

Over the next decade nearly 3 1/2 million manufacturing jobs will likely be needed

Creating a pressing, long-term issue for manufacturers

**2 Million** Are expected to go unfilled due to the skill gap

**78%** CEOs and manufacturing executives worldwide believe the inability to fill positions will impact their ability to **increase productivity**

**Manufacturers will suffer**

**↓ 11%** Loss of annual earnings

**\$14,000** Cost for each unfilled position

**3.4 Million** manufacturing jobs are likely to be needed over the next decade

**2.7 Million** entry-level manufacturing jobs expected from economic expansion

**Only 1.4 Million** jobs are likely to be filled

**2 Million** manufacturing jobs needed due to the skills gap

Source: Global markets based on data from U.S. Bureau of Labor Statistics and Gallup Survey and 2015 study. The slide gap is U.S. Manufacturing.

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**Powered Industrial Exoskeletons – The Best Solution**



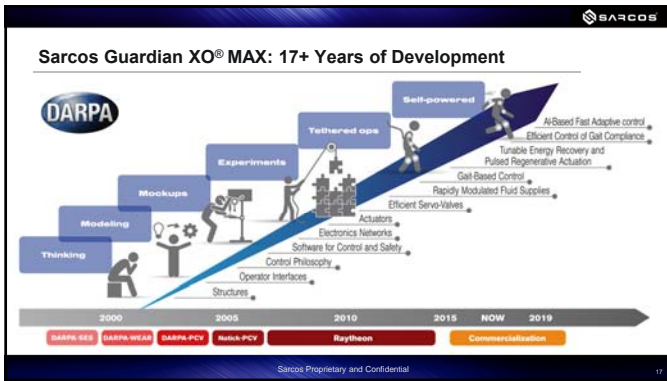
**Exoskeleton Value Proposition**

- Enhance productivity (4-8x)
- Augment strength, endurance and precision
- Reduce injuries and healthcare expenses
- Supports agile manufacturing
- Extend useful life of workers
- Equalize job opportunities

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**Guardian™ XO®**  
Development Evolution

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### XOS®-2 Prototype Early Efforts

Sarcos is the **first and only** company in the world to successfully produce a powered full-body exoskeleton that increases strength and stamina

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### Guardian™ XO®

Commercially Available Q4 2019

- Up to 80 lb. lift
- Up to 4 hours run-time
- Up to 100% of load relief
- Natural, fluid movement
- Full range of motion
- Weight < 50 lbs.
- < 30 seconds to don and doff

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### Guardian™ XO® MAX

Commercially Available Q4 2019

- Up to 200 lb. lift
- Up to 8 hours run-time
- 100% load relief
- Natural, fluid movement
- Full range of motion
- Weight < 135 lbs.
- < 30 seconds to don and doff

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### Guardian™ XO® GT

Getting your arms around the toughest tasks™

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### Guardian™ XO® GT

Getting your arms around the toughest tasks™

7-foot arms lift and manipulate 1,000 lb.

- One or two arms, 500 lb. payload each

High-fidelity force feedback

- Operator can feel the scaled forces of the robot
- Intuitive natural movements with minimal training


Remote or local operations

Platform agnostic

- Mounted on an agile vehicle, wheeled or tracked
- Attaches to any sufficiently-sized mobile platform
- Electric, propane or diesel

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**Guardian™ XO® GT Prototype – Dexterity Demonstration**



- Advanced Manufacturing
- Oil & Gas
- Construction
- Nuclear/Hydro Power
- Disaster Recovery
- HAZMAT

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**Creating the Industrial Work Force of the Future**


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**Innovation in both Technology and Business Model**

Traditional Capital Equipment Model	Sarcos Robot-as-a-Service Model
<ul style="list-style-type: none"> <li>• Large magnitude capital expenditure for purchaser</li> <li>• Hardware purchase where buyer takes responsibility for installation, management of robot</li> <li>• Customer takes all technology risk</li> </ul>	<ul style="list-style-type: none"> <li>• Opex expenditure for purchaser</li> <li>• Robot-as-a-Service provides turnkey availability with Sarcos support for maintenance and upgrades</li> <li>• Hardware + service + cloud data tightly integrates the platform with customers</li> </ul>

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**Delivering the Most Productive, Cost-Effective and Safest Work Force on the Planet**



**Deploying the XO-as-a-Service Fleet**

- Average annual US salaries:
  - Manufacturing – \$44k
  - Iron and Steel Workers – \$53k
  - Senior Construction – \$43k
  - Oil Rig Worker – \$100k
- Average fully burdened with benefits, taxes, facilities, training, management, etc. – \$100k/year
- Base average annual customer charge for:
  - XO: \$50,000
  - XO MAX: \$100,000
- Productivity multiple:
  - 1 operator + 1 XO/MAX = 4 – 8 FTEs (one shift)
  - 3 operators + 1 XO/MAX = 12 – 21 FTEs (three shifts)

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**Sarcos: Creating the Industrial Work Force of the Future**

Combining human intelligence, instinct and judgment with robotic strength, endurance and precision to augment worker performance and keep humans out of harm's way



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Thank You

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