9-15-2021

Hidden in Plain Sight: Why Sustainment is So Critical to the Circular Supply Chains for Technical Products

Dave Peterson

ENGINEERING AND OPERATIONS MANAGEMENT
LUNCH & LEARN WEBINAR SERIES

15 Sept 2021

UNIVERSITY OF ARKANSAS

College of Engineering & Industrial Engineering Programs

- Master of Science
  - Operations Management
  - Engineering Management
  - Engineering
- Graduate Certificates
  - Project Management
  - Lean Six Sigma
  - Homeland Security

UNIVERSITY OF ARKANSAS

Welcome!

Moderator:
Karin Hickenbotham
Marketing & Communications Specialist,
Master of Science in Operations & Engineering Management Graduate Programs

Please save all questions until the end of the presentation.

We ask all questions will be typed in the Chat Box at the end of the presentation.
This webinar is being recorded and will be posted on ScholarWorks@UARK in our Operations Management collection of presentations.

THANK YOU!

LET'S GET STARTED!

UNIVERSITY OF ARKANSAS

UNIVERSITY OF ARKANSAS

College of Engineering

Industrial Engineering

Master of Science in Operations & Engineering Management

Hidden in Plain Sight: Why Sustainment is So Critical to the Circular Supply Chains for Technical Products

Today's Presenter

Dr. Dave Peterson is a senior supply chain management, operations research, and modeling and simulation researcher and practitioner. He specializes in spare parts inventory management and process improvement within the aerospace and defense industry. He is a retired U.S. Air Force logistician, with experience in base- and depot-level supply and maintenance management, graduate logistics education, and policy analysis/project management at the senior staff level. After leaving the military, he was an associate professor at Lynchburg College's School of Business and Economics. Most recently, he advises governmental, aerospace and defense clients on supply chain and operational analytics projects and is an instructor in the MSOM program.

UNIVERSITY OF ARKANSAS

Replace or Repair?

https://www.unitedradio.com/automotive-electronics/

Legend

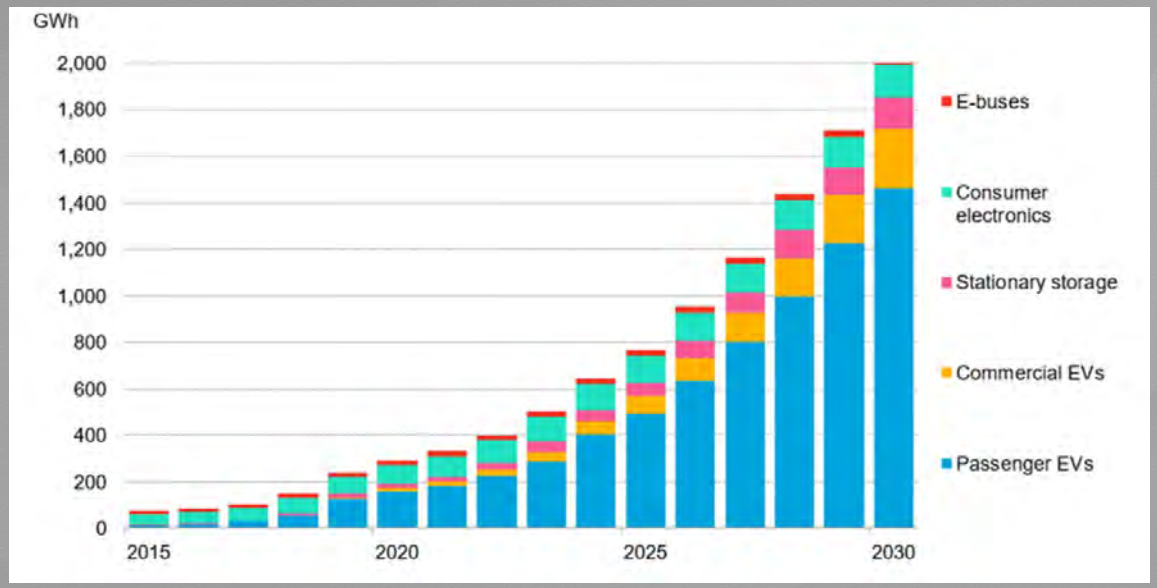
- Failed system
- Serviceable system
- Failed unit
- Repaired unit

UNIVERSITY OF ARKANSAS

The Earth's Resources are Finite

Source: https://earthobservatory.nasa.gov/images/885/earth-from-space

Lithium-Ion Battery Demand Growth Will Significantly Challenge Resources

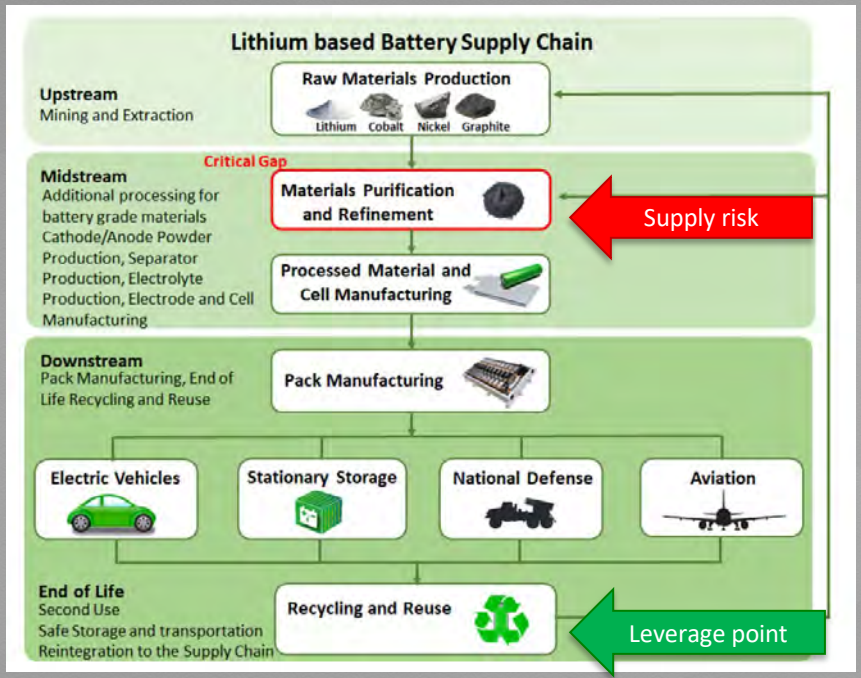


Lithium-ion battery applications are projected to increase 5x – 7x by 2030

Source: The White House. *BUILDING RESILIENT SUPPLY CHAINS, REVITALIZING AMERICAN MANUFACTURING, AND FOSTERING BROAD-BASED GROWTH 100-Day Reviews under Executive Order 14017,* June 2021.

UNIVERSITY OF ARKANSAS

Recycling Improves Supply Resilience

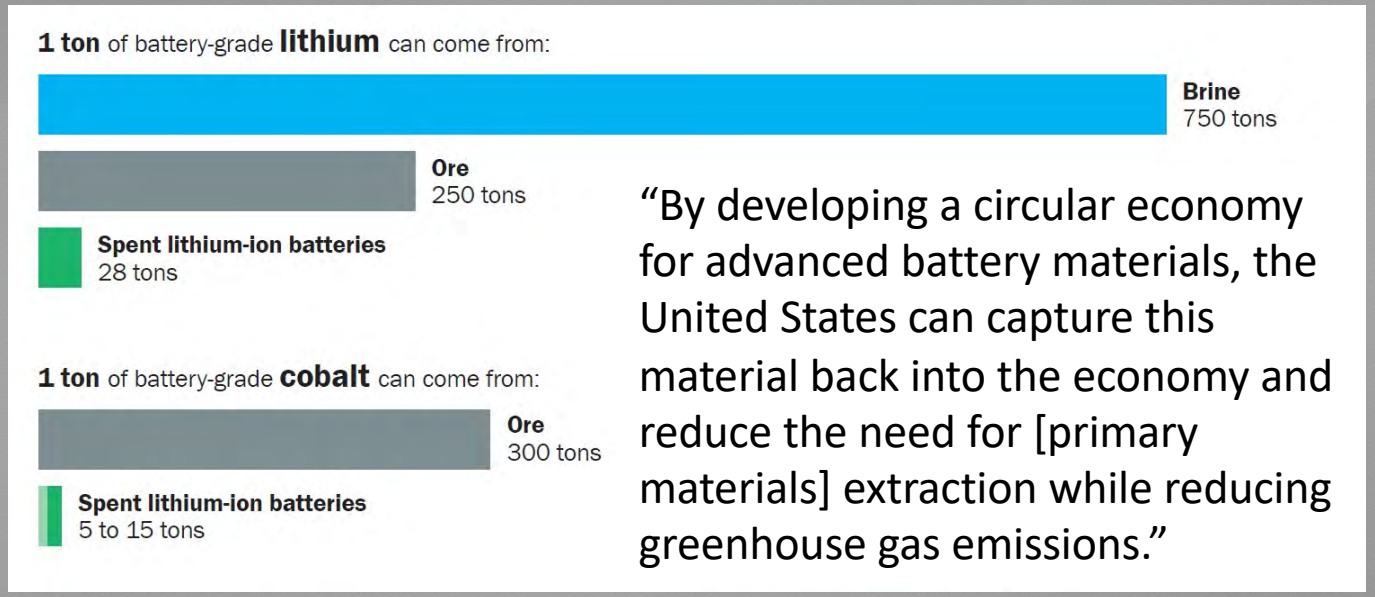


The US needs to "increase domestic battery manufacturing while improving the resilience of the lithium battery supply chain, including the sourcing and processing of the critical minerals used in battery production."

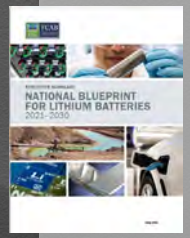
Source: The White House. *BUILDING RESILIENT SUPPLY CHAINS, REVITALIZING AMERICAN MANUFACTURING, AND FOSTERING BROAD-BASED GROWTH 100-Day Reviews under Executive Order 14017,* June 2021.

UNIVERSITY OF ARKANSAS

Recycling also Significantly Reduces Environmental Impacts



"By developing a circular economy for advanced battery materials, the United States can capture this material back into the economy and reduce the need for [primary materials] extraction while reducing greenhouse gas emissions."



Graph source: Federal Consortium for Advanced Batteries, *Executive Summary National Blueprint for Lithium Batteries, 2021-2030*, June 2021

Quote source: The White House. *BUILDING RESILIENT SUPPLY CHAINS, REVITALIZING AMERICAN MANUFACTURING, AND FOSTERING BROAD-BASED GROWTH 100-Day Reviews under Executive Order 14017,* June 2021.

UNIVERSITY OF ARKANSAS

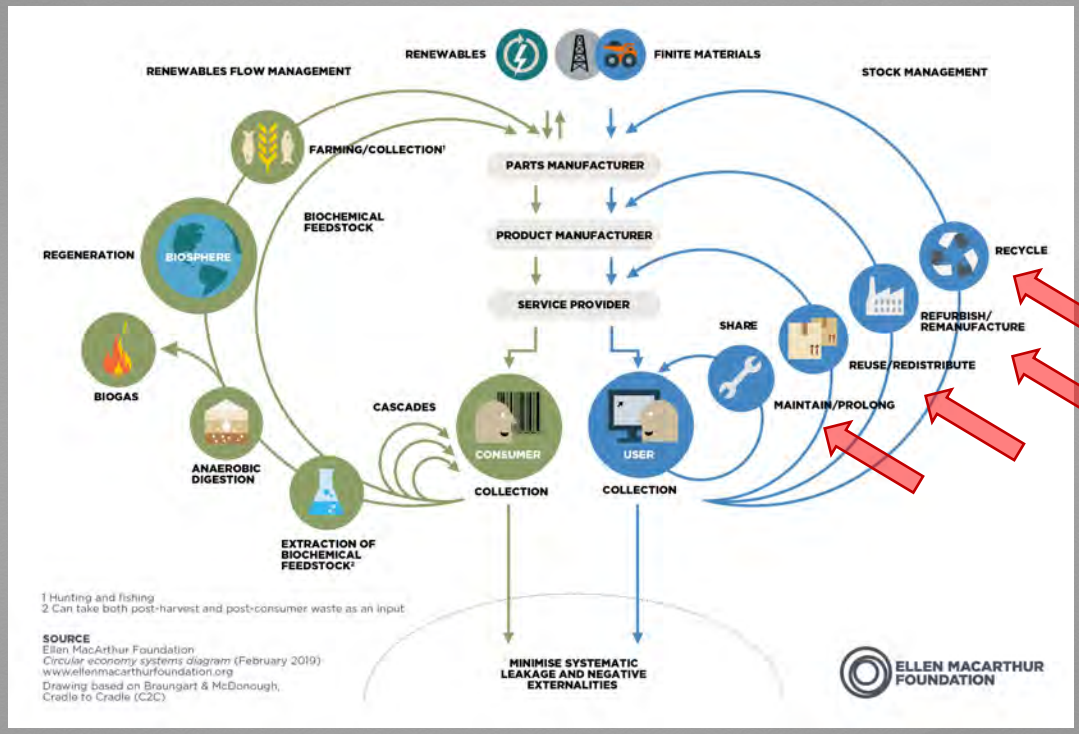
So, what is the circular economy?

"The idea of a circular economy is simple: to make better use of resources, close loops of resource flows by fully recovering materials instead of wasting them, and prevent waste and pollution by better design of products and materials and keeping them in use for longer."

Source: Anne Velenturf & Phil Purnell, "What a sustainable circular economy would look like," *The Conversation Newsletter*, 6 May 2020.

The "30,000 Foot View"

Biological & Renewable Products

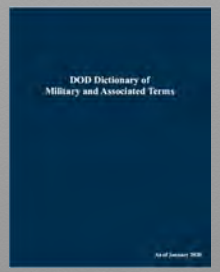


Manufactured Products

Source: World Economic Forum, *Towards the Circular Economy: Accelerating the scale-up across global supply chains*, Jan 2014

Sustainment is …

"The provision of logistics and personnel services required to maintain and prolong operations until successful mission accomplishment."



Source: Department of Defense, *DOD Dictionary of Military and Associated Terms,* Joint Chiefs of Staff Joint Electronic Library, January 2020. Photo: U.S. Navy photo by Mass Communication Specialist 3rd Class Kenneth Abbate) File# 120212-N-OY799-418

UNIVERSITY OF ARKANSAS

What types of systems need sustainment?

Photo: U.S. Air National Guard photo by Senior Airman Bruce Jenkins. File# 160406-Z-AA000-013.

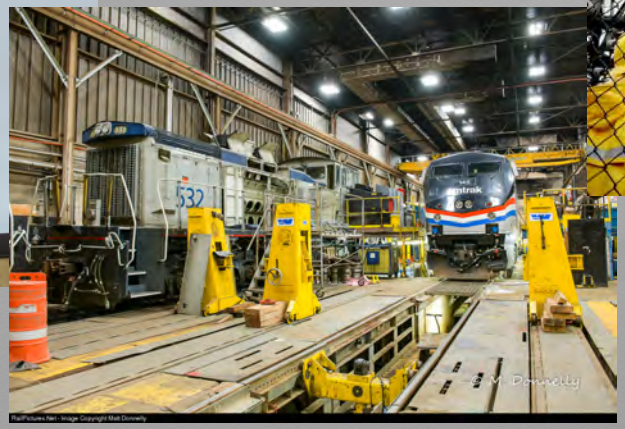
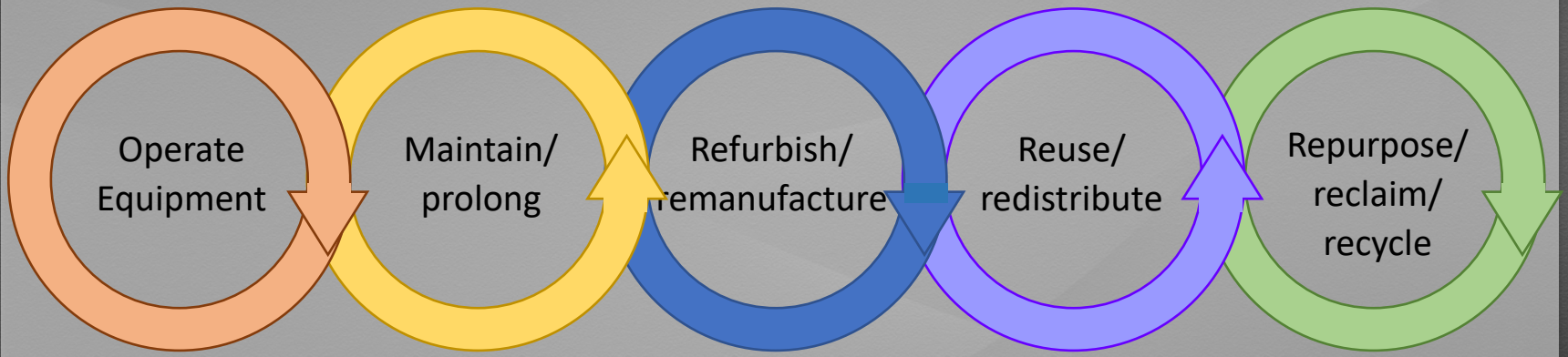


Photo: Courtesy of Matt Donnelly, at https://www.railpictures.net/photo/599007/.

Photo: U.S. Air Force photo by Senior Airman Tristin English. File# 140403-F-OH119-084.JPG.

The “10,000 Foot View”



Logistics Activities Within a Sustainment Network

- **Supply** – having repair parts on-hand when and where needed
- **Maintenance** – the ability to fix broken items
- **Transportation/Distribution** – the ability move items throughout the sustainment network
- **Procurement** – sourcing repair parts, equipment and services

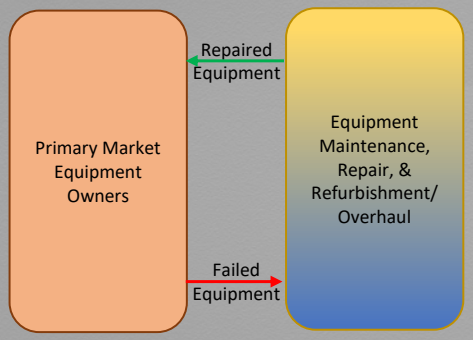
Operate Equipment

Primary Market Equipment Owners

Photo: U.S. Army Reserve photo by Capt. Colin Cutler. File# 170504-A-GJ827-733.JPG.

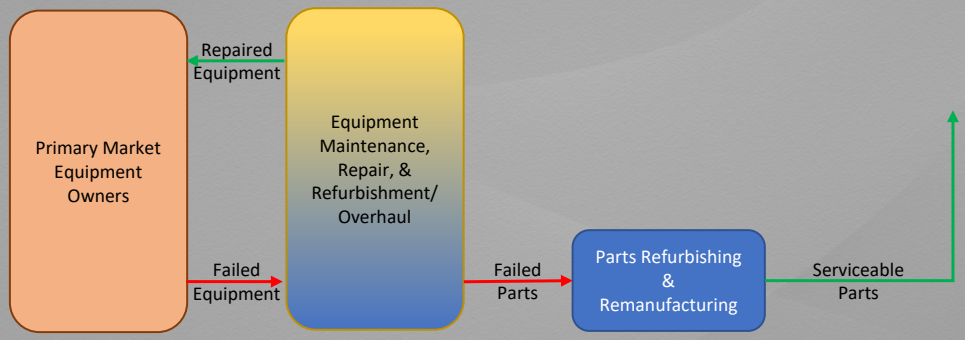
UNIVERSITY OF ARKANSAS

Maintain/Prolong



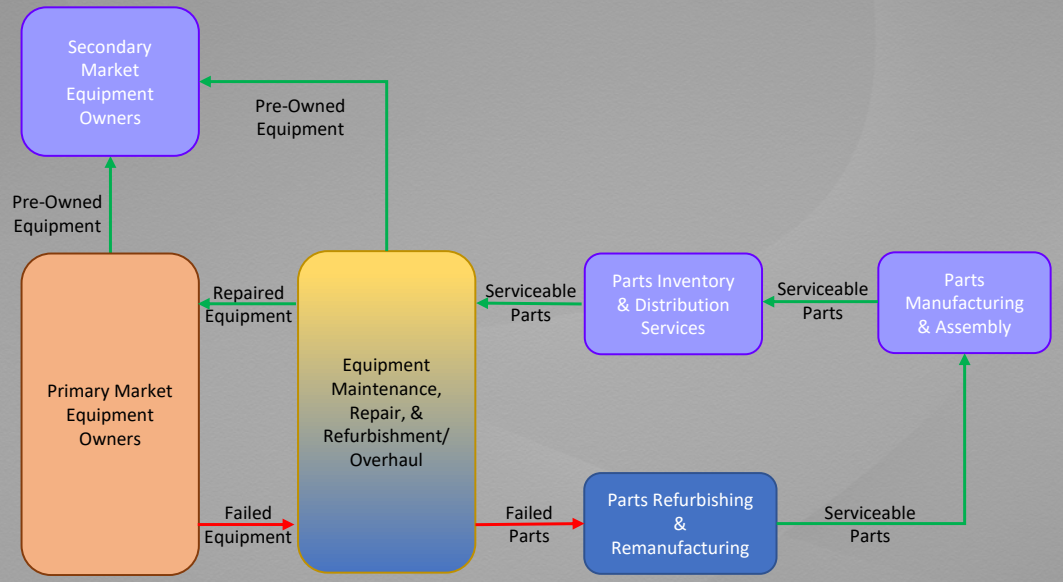
UNIVERSITY OF ARKANSAS

Refurbish/Remanufacture

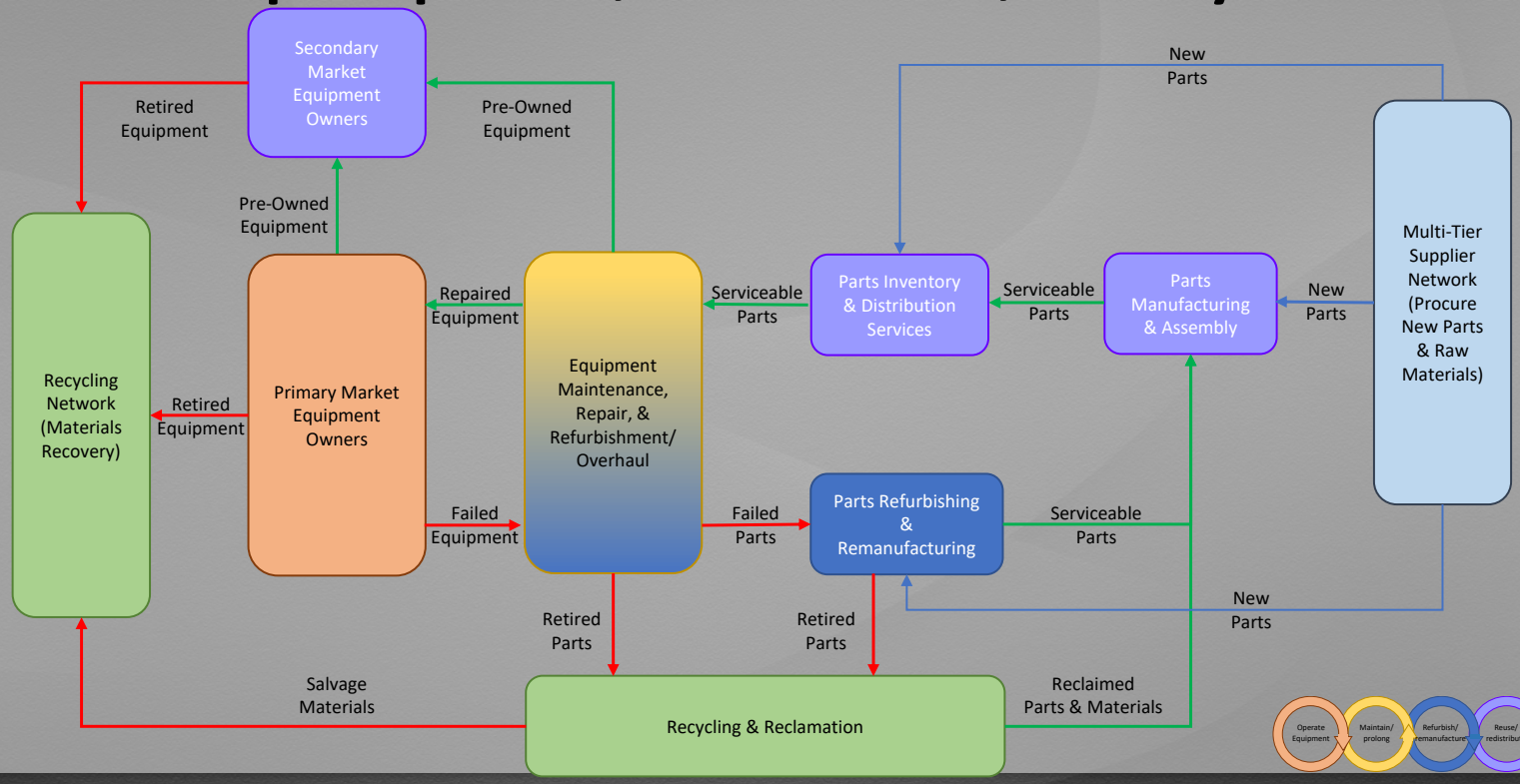


UNIVERSITY OF ARKANSAS

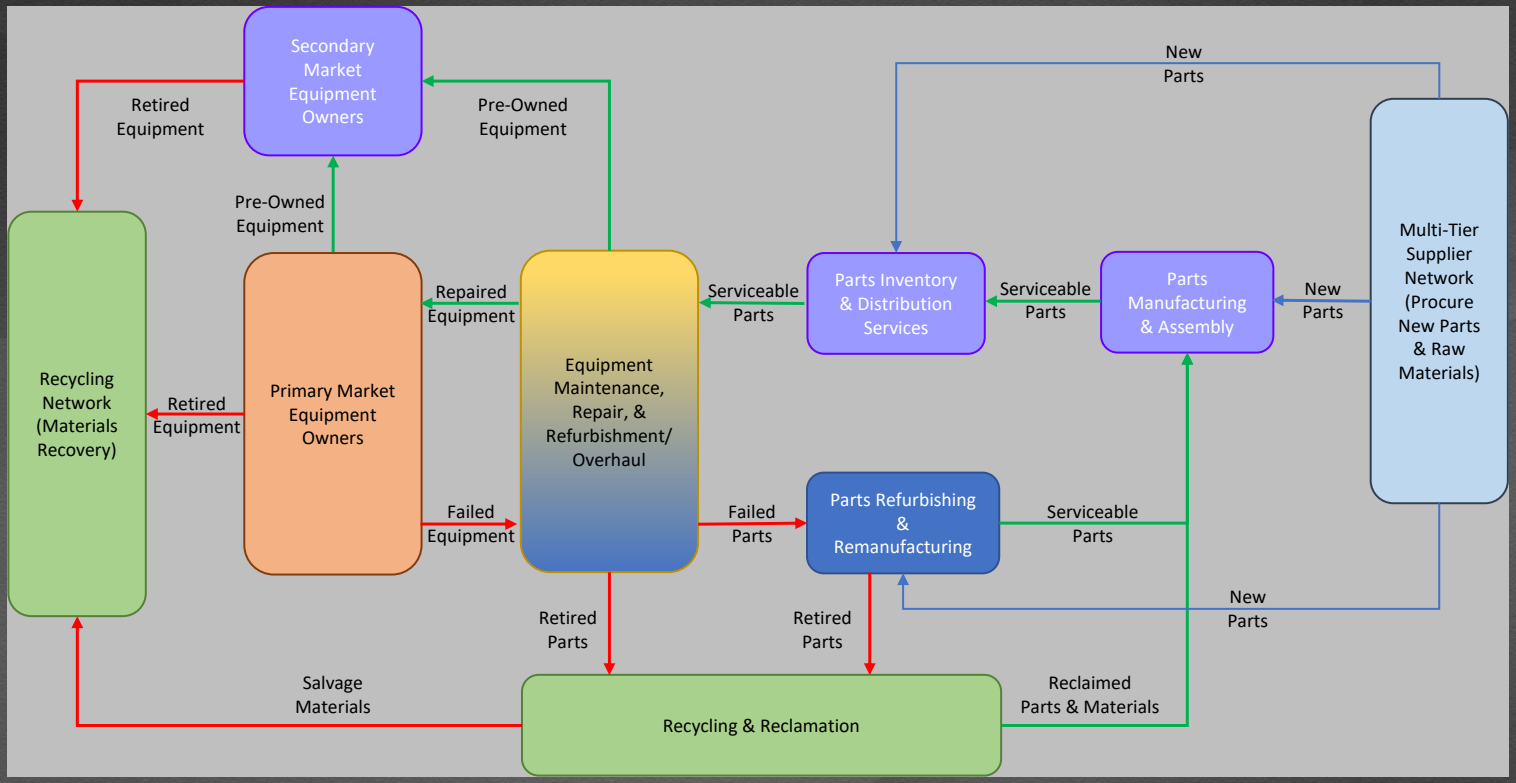
Reuse/Redistribute



Repurpose, Reclaim, Recycle



UNIVERSITY OF ARKANSAS



"What type of Sustainment Activity is This?'

A brief detour to explore the world of systems sustainment!

What type of Sustainment Activity is This?

a. **Operations** – use equipment

b. **Reclamation** – salvage useable parts ✓

c. **Refurbish** – make equipment serviceable

d. **Repair** – maintain equipment

Photo: U.S. Air Force photo/Staff Sgt. Bennie J. Davis III. File# 091217-F-5040D-1204.JPG.

What type of Sustainment Activity is This?

a. **Reclamation** – salvage useable parts
b. **Recycle** – recover elemental value ✓
c. **Remanufacture** – make equipment good-as-new
d. **Repair** – maintain equipment

Photo: Defense Logistics Agency photo/Todd Maki. File# 200915-F-TG847-1200.JPG.

UNIVERSITY OF ARKANSAS

What type of Sustainment Activity is This?

a. **Operations** – use equipment
b. **Reclamation** – salvage useable parts
c. **Recycle** – recover elemental value
d. **Remanufacture** – make equipment good-as-new
e. ✓ **Repair** – maintain equipment

UNIVERSITY OF ARKANSAS

Photo: Amtrak photo/0945-MRUK_JMM7001_KevinSczubelek_Bear/ Edward Mruk.

What type of Sustainment Activity is This?

a. **Operations** – use equipment
b. **Remanufacture** – make equipment good-as-new
c. **Repair** – maintain equipment
d. **Repurpose** – find useful applications for old equipment

UNIVERSITY OF ARKANSAS

Photo: Defense Logistics Agency photo/Disposition Services. File# 070721-D-AU600-502.JPG.

What type of Sustainment Activity is This?

a. **Operations** – use equipment
b. **Reclamation** – salvage useable parts
c. **Recycle** – recover elemental value
d. **Remanufacture** – make equipment good-as-new
e. **Repair** – maintain equipment

UNIVERSITY OF ARKANSAS

Photo: Courtesy of Matt Donnelly, at https://www.railpictures.net/photo/620685/.

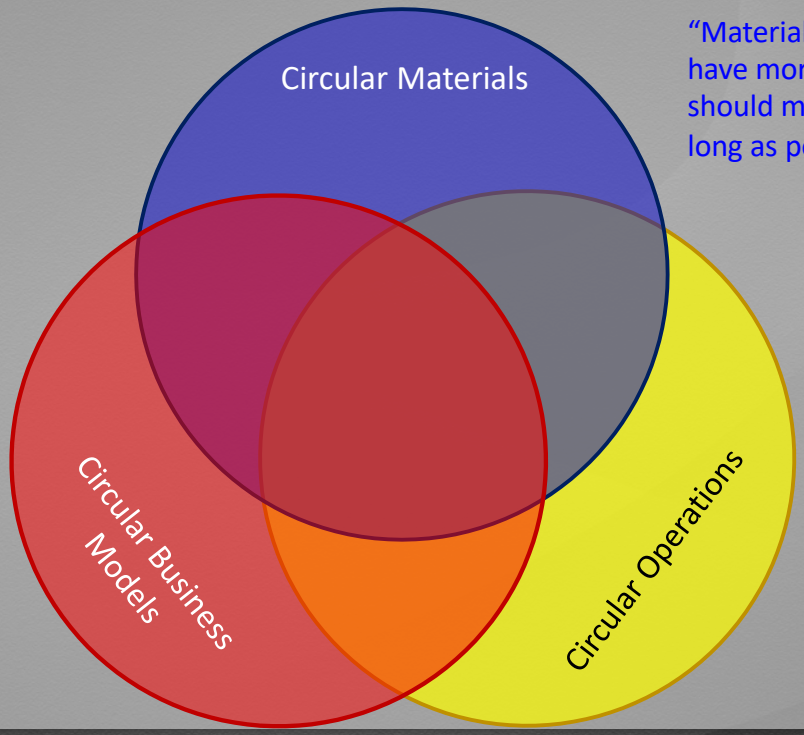
What type of Sustainment Activity is This?

a. **Operations** – use equipment
b. **Reclamation** – salvage useable parts
c. **Recycle** – recover elemental value
d. ✓ **Refurbish** – make equipment serviceable
e. ✓ **Repair** – maintain equipment

UNIVERSITY OF ARKANSAS

Photo: U.S. Air Force photo/Senior Airman Xiomara M. Martinez. File# 200430-F-JT831-003.JPG.

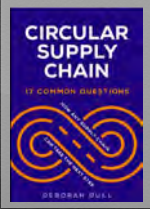
Components of Circularity



"Materials circulate because they have more value to give, and we should maximize their value for as long as possible."

"A Circular Business Model shifts from traditional consumption-based sales models to use-based sales models."

"*Circular Operations* reduce what is needed, use materials that have been used before, and find uses for all process outputs."

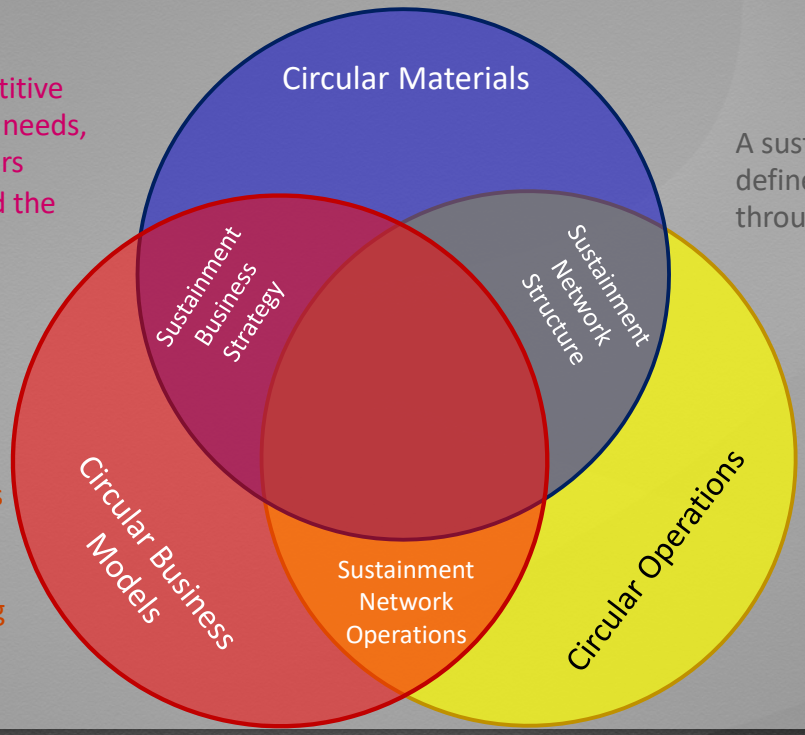


Source: *Circular Supply Chain: 17 Common Questions: How Any Supply Chain Can Take the Next Step,* Deborah Dull, August 2021.

UNIVERSITY OF ARKANSAS

Sustainment Enables Circularity

While an organization's competitive strategy defines its customers' needs, its sustainment strategy answers questions about how to extend the product's useful life.

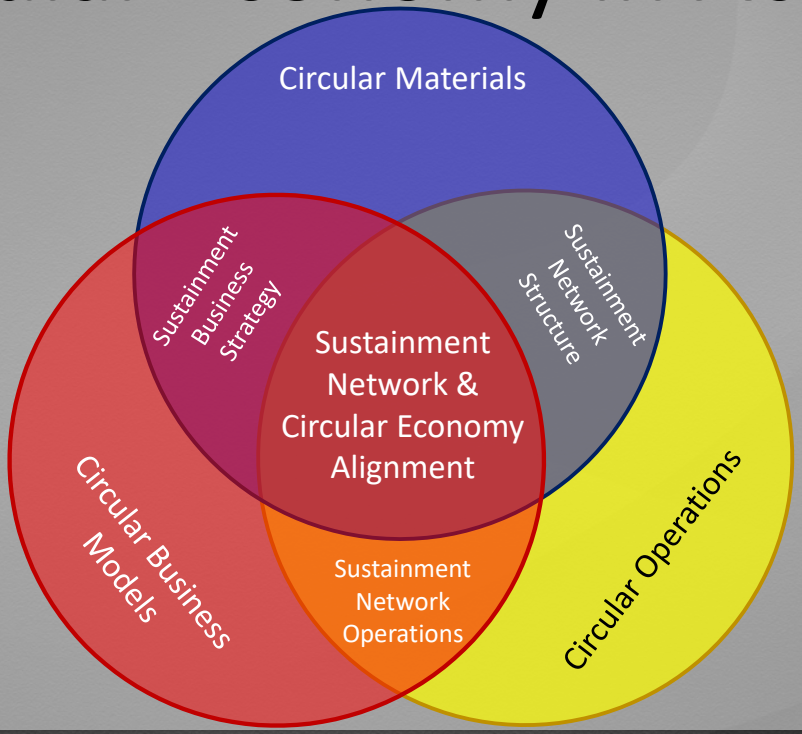


A sustainment network's structure defines the physical flow of assets through the system.

Sustainment Network Operations translate the organization's sustainment business strategy into the daily routine of providing sustainment services to its customers.

UNIVERSITY OF ARKANSAS

Circularity + Sustainment → Circular Economy in Action



UNIVERSITY OF ARKANSAS

Let's Recap Today's Key Ideas

"Supply chain pros can change our operations to become circular *even if the business model is not.*"

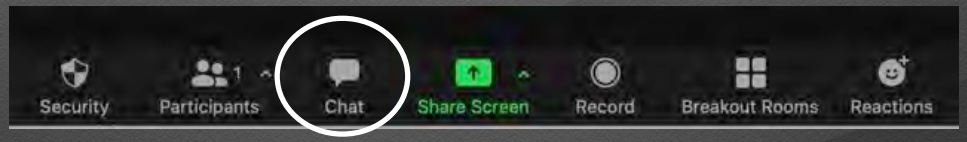
Deborah Dull

1. The Earth is running out of resources which will have a direct impact upon maintaining/improving our quality of life.
2. s
   --
   y
3. Sustainment networks and practices are all around us yet they often go unnoticed.
4. More attention is needed on how to actually carry out the circular activities of keeping technical products serviceable.

https://earthobservatory.nasa.gov/images/885/earth-from-space

Question and Answer with Dave!

Type your questions in the chat box of this session.



UNIVERSITY OF ARKANSAS

M.S. Operations Management

at a glance:

- 100% Online (or live)
- In-State Tuition for Everyone!
- 10 Graduate Course Program (30 hours)
  - Up to 4 prerequisite classes may be required
- Five 8-week Sessions Per Year
- Pair Master's with Graduate Certificate with no extra hours required
- No GRE/GMAT required with 3.0 Bachelor's GPA
- Total Program Cost is $12,000 to $15,000 (depending on prereqs needed)

Graduate Certificates

Project Management – Designed to provide skills to become better project managers and prepare for PMP Certification

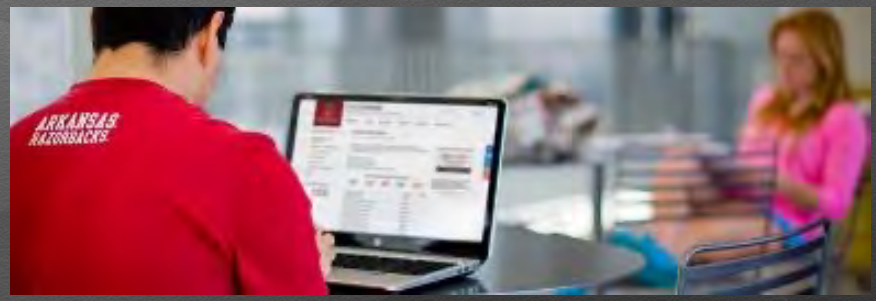
Lean Six Sigma – Learn how to eliminate problems, remove waste and reduce variation to improve operations

Homeland Security – Designed for industry and safety professionals to learn how to mitigate risk

UNIVERSITY OF ARKANSAS

Graduate Certificates

- Only 4 Classes!
- Obtain as part of your Master's Degree without taking extra classes. Classes will double count!
- Can also be completed as stand-alone program
- 2.5 Undergraduate GPA required for admission
- No GRE/GMAT
- Transition to MSOM option with no GRE



UNIVERSITY OF ARKANSAS

Covid-19 Special Announcement:

Effective through Spring 2022 term, at this time we are waiving the GRE for applicants with a 2.5-2.99 undergraduate GPA.

Applicants with above a 3.0 GPA the GRE is automatically waived for any term.

Once GRE testing centers resume operations, the standard admissions requirements will go back into full effect.

NEXT WEBINAR:

Topic: Third-Party Management & Cyber Supply Chain Risk Management

Presented by: Jerald Garner

THANKS FOR ATTENDING!

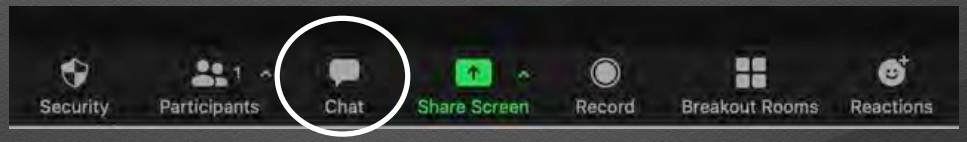
- For information about our flexible degree program options, email our staff at msom@uark.edu
- Visit **operations-management.uark.edu**

- *Registered* participants will receive an email with the video link to this webinar. We hope to see you online next month!

UNIVERSITY OF ARKANSAS

Question and Answer with Dave!

Type your questions in the chat section of this session.



UNIVERSITY OF ARKANSAS