

# Reshaping Project Efficiency with AI and Automation

Moderator: Brian Duffy, Stanley Consultants, Inc.

Speakers:

- Matt Matteson, E&E Digital Project Delivery Lead, WSP
- Oswaldo Pinero, Automation Partners Team Lead, WSP

May 14, 2024, 1:30 p.m.



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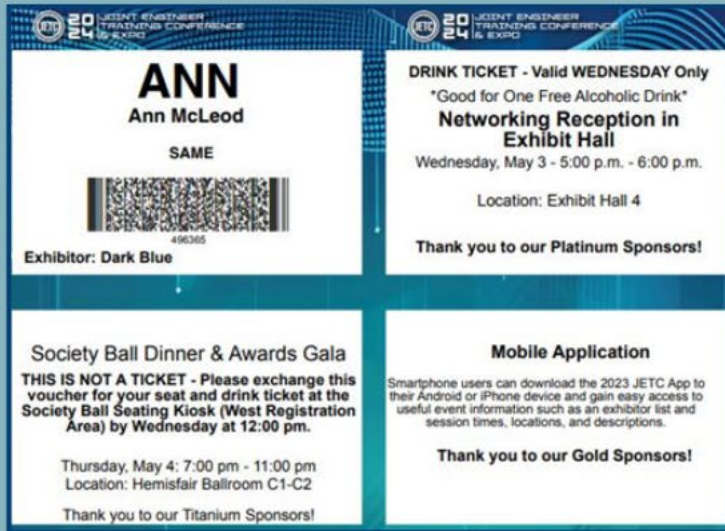
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# SPEAKER



**Matt Matteson, P.E., P.G.**  
WSP  
E&E Digital Project Delivery Lead

## Fun Facts

- Loves board games
- Favorite Book: Things to Make and Do in the Fourth Dimension
- Apps, AI and Automation Practice Area Network Lead

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# SPEAKER



Oswaldo Pinero, CSM  
WSP  
Power Platform Developer

## Fun Facts

- Adult Fan Of Lego (AFOL)
- Loves Soccer and Music
- Certified Scrum Master

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# AI Terminology



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# AI Inflection Point: The Emergence of Generative AI in 2023

**The Economist** | Menu | Weekly edition | The world in brief | Search

Culture | Johnson

## Our word of the year for 2023

It will be on people's lips for years to come

*Generative* would be the word of the year if it were more widely known and used beyond the experts who follow AI. But since its launch in 2022, one term in particular—ChatGPT—has been on the lips of everyone from journalists to cab drivers wondering what all the fuss is about. Can a name be a word of the year? Is it even a word?

Yes. Names are nouns. And Google searches for “ChatGPT” are more than 90 times as frequent as those for “generative AI” or “large language model”. ChatGPT is the same in every language. Moreover, trade names have a long history of spreading into the collective parlance: aspirin, escalator, Hoover and Frisbee. (Though it is a mark of success, companies desperately [try to prevent](#) the “genericide” of their brands.)

In technology, most people “Google” rather than generically “search online”. And in that same vein, ChatGPT is the conversational term for any LLM: “What a lousy break-up text—did he get ChatGPT to write that?” The people have spoken with their overwhelming interest. It is impossible to pick anything else for Johnson’s word of the year.

### Harvard Business Review

AI

PUBLICATION DATE	Count
Last 6 months	120
Last 12 months	212
Last 24 months	281
Older than 24 months	435

2023  
**+307% Growth**  
2022

---

Generative AI

PUBLICATION DATE	Count
Last 6 months	45
Last 12 months	75
Last 24 months	76
Older than 24 months	1

2023  
**Emerging Field**

# But what is it?

Artificial Intelligence: Computer systems and algorithms that possess the ability to mimic human intelligence, learn from data, adapt to new information, and perform tasks typically requiring human cognitive capabilities, such as:

Machine Learning  
Natural Language Processing  
Computer Vision  
Robotics





Leveraging all of these, a very powerful model can be created. To our project, this means:

- Machine Learning: Training algorithms mimicking human behavior to be able to support our work
- Natural Language Processing
- Computer Vision
- Robotics



Leveraging all of these, a very powerful model can be created. To our project, this means:

- Machine Learning
- Natural Language Processing : Understand the relation semantics of words observed to know what words relate to what topics
- Computer Vision
- Robotics

Leveraging all of these, a very powerful model can be created. To our project, this means:

- Machine Learning
- Natural Language Processing
- Computer Vision: Observe the graphical user interface (GUI) to perform optical character recognition (OCR) to read handwriting and text inputs
- Robotics

Leveraging all of these, a very powerful model can be created. To our project, this means:

- Machine Learning
- Natural Language Processing
- Computer Vision
- Robotics: Document Scanning and Processing Machinery – this may seem unimportant, but is our current greatest limiting factor

# Applied AI: Image Recognition and Transcription



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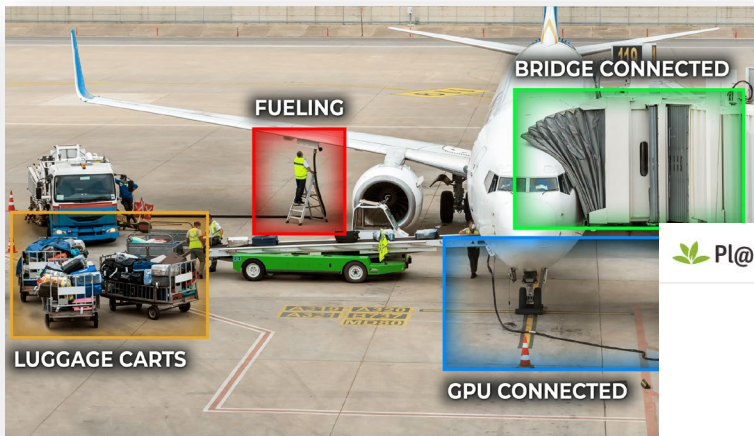
# Fundamentals of Image Recognition

- **Image Recognition.** Is the process of teaching computers to recognize and process images in a manner similar to human vision.

# Image Recognition Steps

- **Acquisition.** An image is acquired, often as a digital photo, scanned document, or possibly video
- **Pre-Processing.** Enhancements are applied to the image to reduce noise. (e.g, adjust brightness, contrast, rotation)
- **Feature Extraction.** Algorithms extract relevant features from the image data and store it as
- **Classification.** The system interprets the features to categorize the image content.

# Examples of Image Recognition Use Cases



PI@ntNet Identify Explore ▾ Sign in Register EN ▾

Identify, explore and share your observations of wild plants

PI@ntNet is a tool to help to identify plants with pictures. It is organized in different thematic and geographical floras. Choose the one that corresponds to your region or area of interest from the list below. If you don't know what to choose, select "World flora" which has the widest coverage but will give less accurate results than a more focused flora.

Learn more on plantnet.org

Latest observed species

*Asarum arifolium* Michx.

Try PI@ntNet now!

add / drop an image

or add an uri

Latest contributions

*Viola palustris* L.



# Early Image Recognition – Google Lens

Time Period	Event	Details
Early 2000's	Inception of Google's reverse image search	Exact date unknown
2010s	Functionality	Users can drag and drop an image, upload a file, or enter an image URL on Google to initiate the search
2020s	Evolution	Since its inception, Google's reverse image search has evolved, incorporating advanced algorithms and machine learning to improve accuracy and user experience
Present Day (January 2024 Update)	Circle to Search, AI-Multisearch	Take a photo and instantly be able to identify anything, and even get links to buy it if interested





# Future Image Recognition – Just Walk Out

Tools like Amazon's Just Walk Out shopping allow for cameras to keep track of everything you purchase, and then just walk out.



# How This Works: Image Recognition – LLMs


















- Models are trained to reflect different scenarios. The more complex the possible scenarios, the more images are needed.
- Image recognition software looks for patterns or features to guess what is a match on the newest one based on similarity to the data set.
- Important to make sure there is a check for non-matches



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# Build Your Own Tool – AI Builder

 <p>Document processing Extract custom information from documents</p> <p>CUSTOM MODEL</p>	 <p>Invoice processing Extract information from invoices</p> <p>PREBUILT MODEL</p>	 <p>Text recognition Extract all the text in photos and PDF documents (OCR)</p> <p>PREBUILT MODEL</p>	 <p>Receipt processing Extract information from receipts</p> <p>PREBUILT MODEL</p>	 <p>Identity document reader Extract information from identity documents</p> <p>PREBUILT MODEL</p>	 <p>Business card reader Extract information from business cards</p> <p>PREBUILT MODEL</p>
 <p>Sentiment analysis Detect positive, negative, or neutral sentiment in text data</p> <p>PREBUILT MODEL</p>	 <p>Category classification Classify customer feedback into predefined categories</p> <p>PREBUILT MODEL <a href="#">PREVIEW</a></p>	 <p>Entity extraction Extract key elements from text, and classifies them into predefined categories</p> <p>PREBUILT MODEL</p>	 <p>Key phrase extraction Extract most relevant words and phrases from text</p> <p>PREBUILT MODEL</p>	 <p>Language detection Detect the predominant language of a text document</p> <p>PREBUILT MODEL</p>	 <p>Text translation Detect and translate more than 90 supported languages</p> <p>PREBUILT MODEL</p>
 <p>Category classification Classify texts into custom categories</p> <p>CUSTOM MODEL</p>	 <p>Entity extraction Extract custom entities from your text</p> <p>CUSTOM MODEL</p>	 <p>Prediction Predict future outcomes from historical data</p> <p>CUSTOM MODEL</p>	 <p>Object detection Detect custom objects in images</p> <p>CUSTOM MODEL</p>	 <p>Image description Generate description of an image</p> <p>PREBUILT MODEL <a href="#">PREVIEW</a></p>	



# Applications for This Project

- Choose document type  
Unstructured and free-form documents
- Choose information to extract  
2 fields, 1 table
- Add collections of documents  
2 collections
- Tag documents  
10 documents tagged
- Model summary

### Add collections of documents

Add sample documents for your model to study. Put similar documents into the same collection

Create a collection for each similar documents ⓘ

**Add documents** ⓘ

**Collection 2**

5 documents

**Collection 1**

5 documents

Document Processing 22/2/2024, 1:46:15 pm | Quick tips | Save and close

1 of 1

**North**

Details from Working Drawing 04NAM-0404-REVISION-0051-0433

NOTES:

Name print	Signature	Date
QC Representative: Adam Davis		3-24-23
QA Representative: Reid Crawford		7-25-23

Joint ID	Member 1/2	RC Ser.#	Qty Installed	Date Stuffed	Date Snugged	Date Tensioned	Date QA Testing
U08 - E0-S17N - Bottom	U08E0511U08E0510	2022-39655	64	3-28-23	3-22-23	3-22-23	7-25-23

Collection 1

Document 1 of 5

Text fields ⓘ

- Details
- Notes
- Tables ⓘ
- Table 1
- Page 1





# Future Applications for This Type of Tool

- **Material Tracking:** Capture information from material labels, such product code, quantities and expiration dates.
- **Inspection Reports:** Automatically process inspection reports and identify defects or deviations from design specifications.
- **As-Built Documentation:** Extract text from photos of completed structures. This helps create accurate as-built documentation for future reference.
- **Field Notes:** Capture handwritten field notes or measurements. It reduces manual data entry and improves data accuracy.



# Data Extraction and Quality Control



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# Confidence Scoring - General

- Range that goes from 0 to 100 and indicates the confidence that the answer is the right match for the given Query.
- This is a great way to understand in what areas you might need to add additional QA/QC or continue to train your model to be more effective.



# Quality Review Best Practices

- It is important to provide user with the full picture. Not only the values extracted but the confidence score and the file names where the information was extracted. That way the information can be easily verified.

# Lessons Learned Around Quality

- AI Builder can correctly identify pages that are rotated.
- By default, it will process the first page that it matches the model. For multiple pages PDF user will have to break it into single files or add steps on the automation to loop through the file.
- The systems struggles with low contrast file. E.G red ink on a pink paper.

# Examples in Practice



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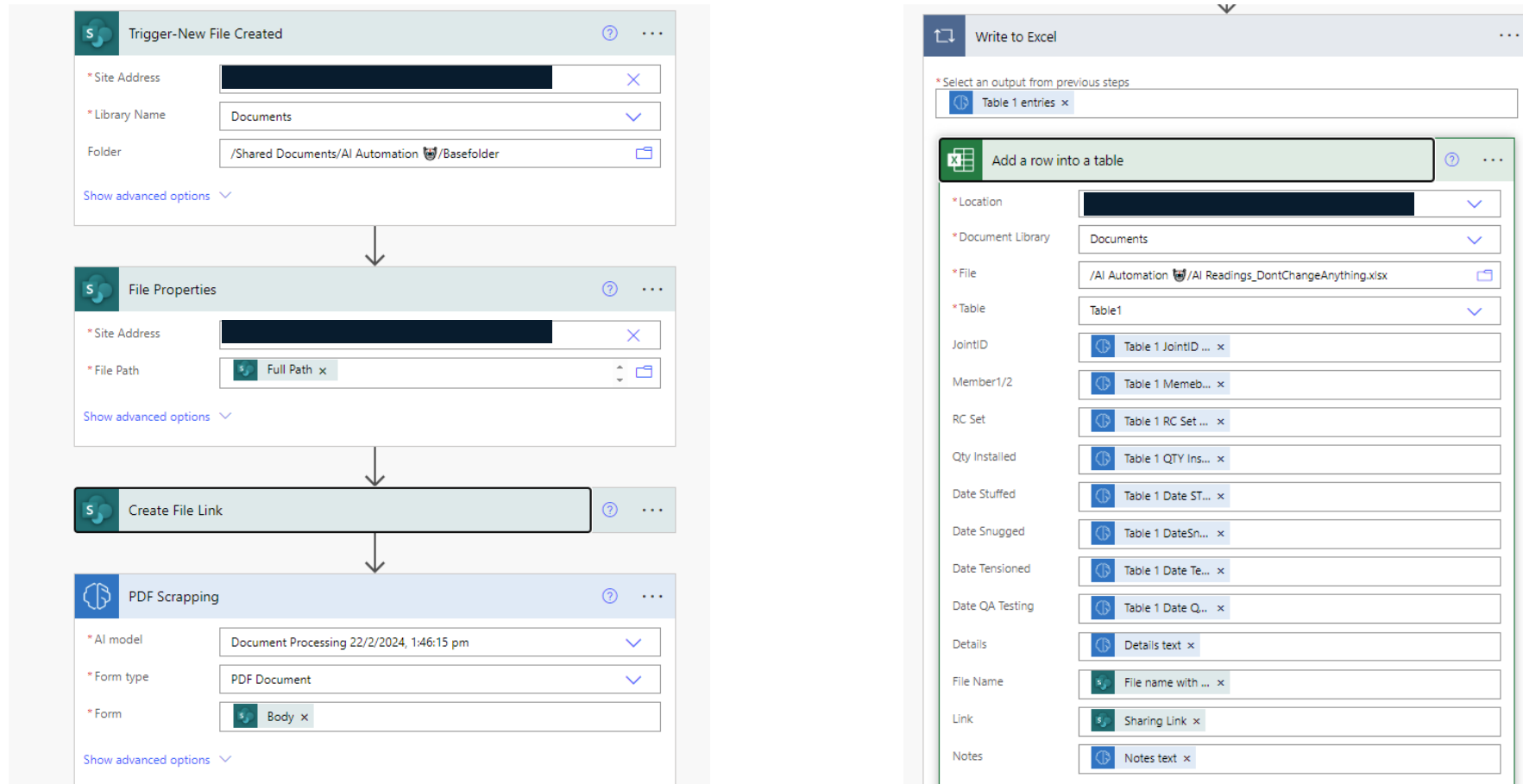


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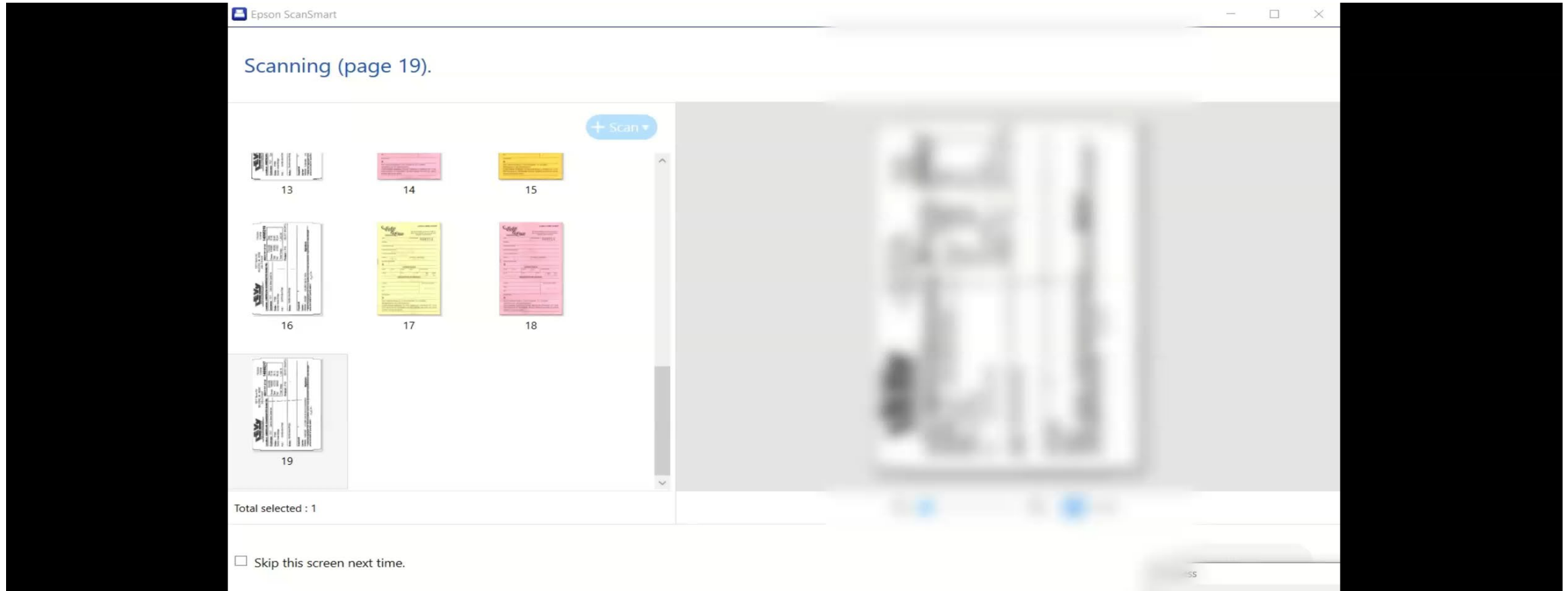
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# Behind the scenes, here is what is happening





# Behind the scenes, here is what is happening



*Live Content Slide*

**Poll: Will you try out this technology?**

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Automation

# THANK YOU

Please take a few minutes to complete a short survey about this session. Your feedback will help us improve future programming for JETC.

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# Q&A

- Matt Matteson, [Matt.Matteson@wsp.com](mailto:Matt.Matteson@wsp.com)
- Oswaldo Pinero, [Oswaldo.Pinero@wsp.com](mailto:Oswaldo.Pinero@wsp.com)