



# The Appalachian Digital Future

Lessons Learned Integrating Digital  
Tools with Major Capital Project  
Execution

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**Advisian**

WorleyParsons Group



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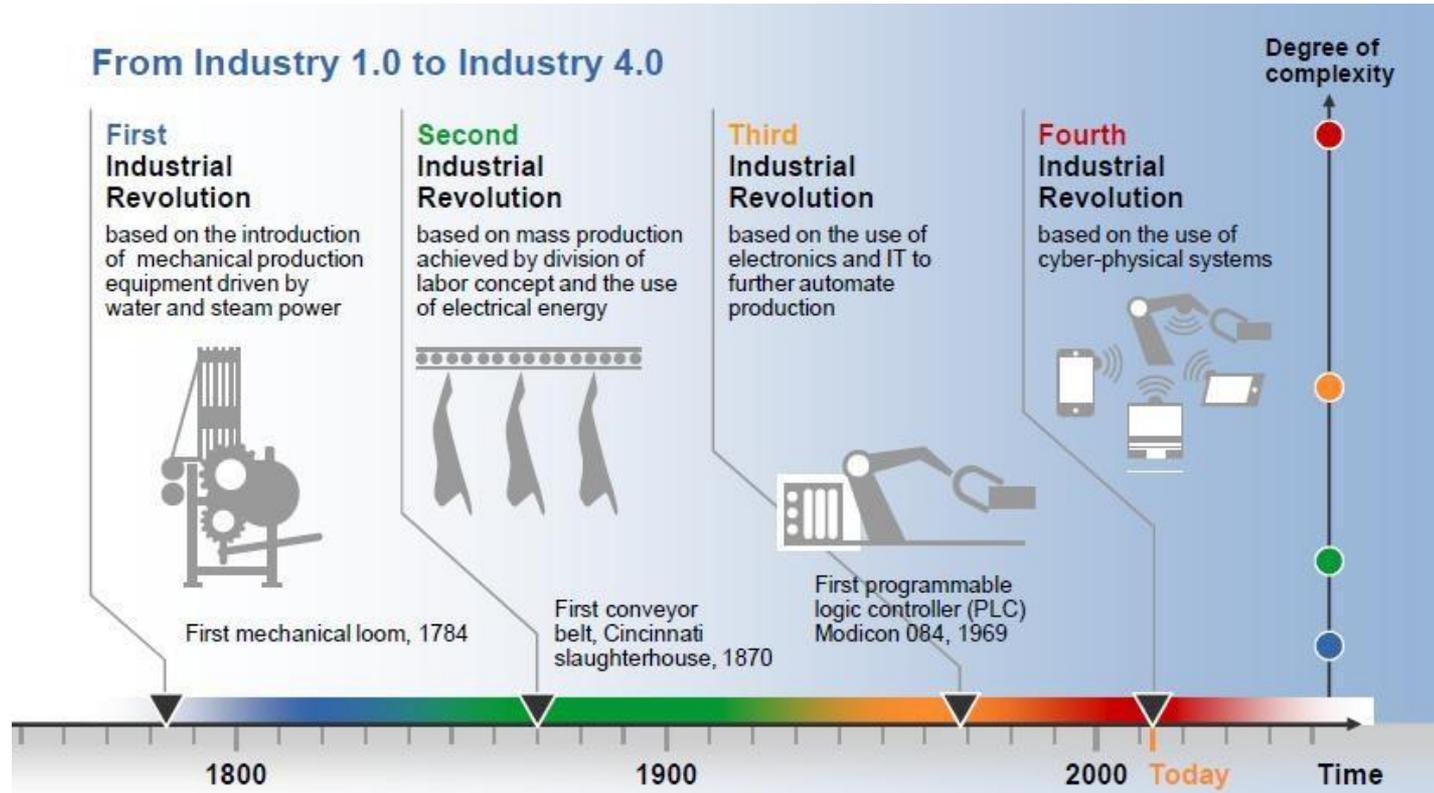
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The U.S. is in place to be the most competitive global manufacturer of chemicals as a result of hydraulic fracturing and natural gas...

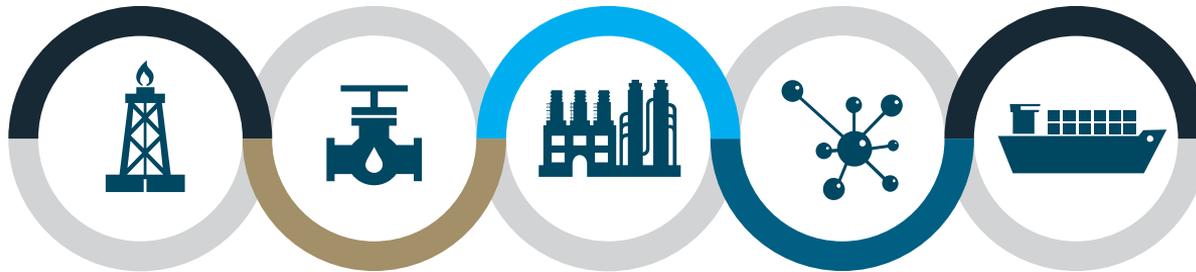
...and the wave of investments is far from over.

The American Chemistry Council (ACC), June 2017

# What is Industry 4.0?



# Regional value chain vs. Industry 4.0



## PRODUCTION

Stabilization around 60+ USD/BBL and increased drilling activity

## MIDSTREAM

Key pipeline projects connecting shale basins to markets. Key liquids storage enablers needed.

## PETROCHEMICALS

Main ethylene production and enablers include infrastructure & utilities.

## DERIVATIVES

Specialty chemical production with access to feedstock and GDP + growth

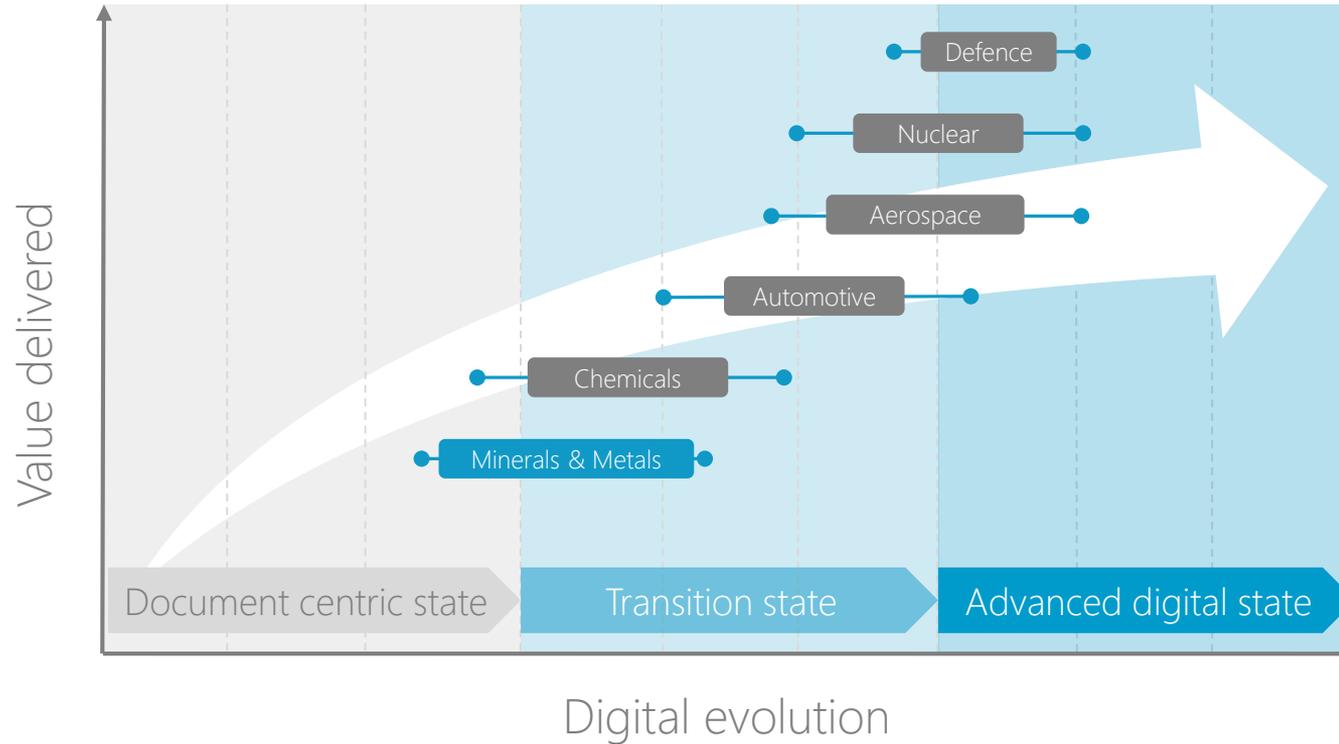
## LOGISTICS

Rail, port and road distribution of intermediate or final products.

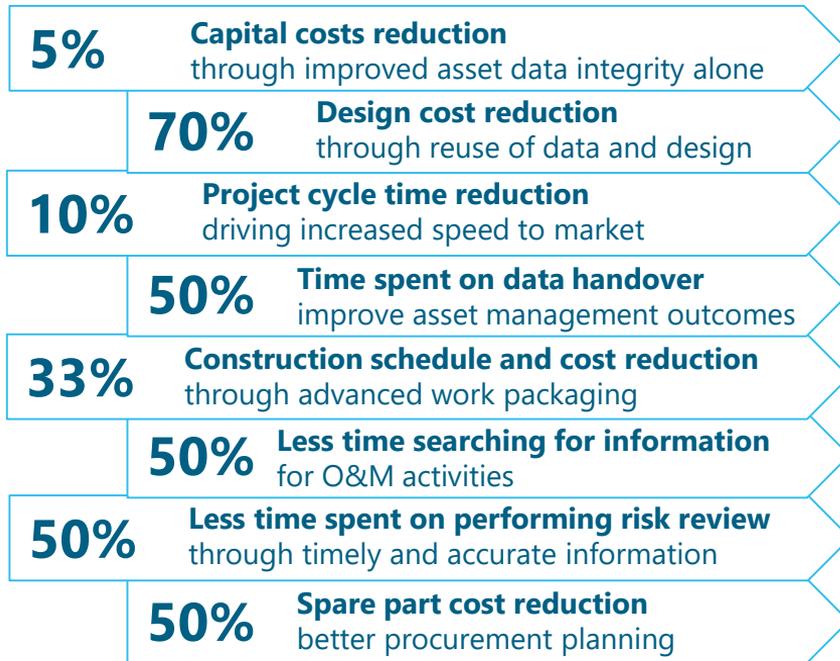
***“The full benefit of PA’s energy resource will only emerge when the state’s natural gas supply is met by robust and sustained local demand – the downstream sectors that will multiply GDP, jobs, and government revenues.”\****

\*Forge the Future: Ideas for action

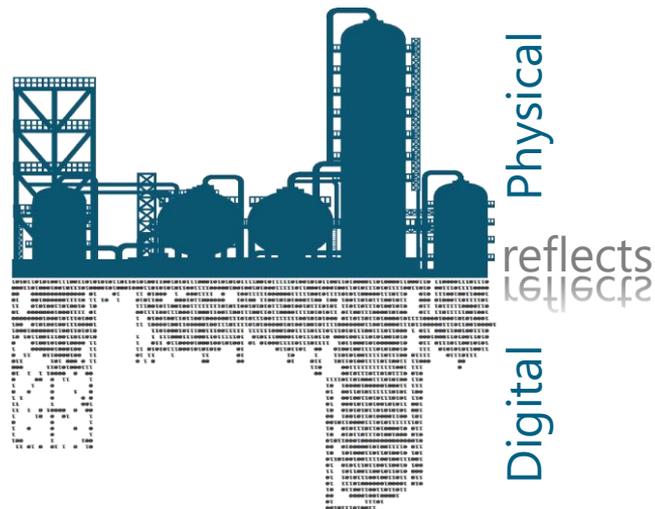
# Digital evolution



# Digital alignment in the chemicals industry can deliver big savings

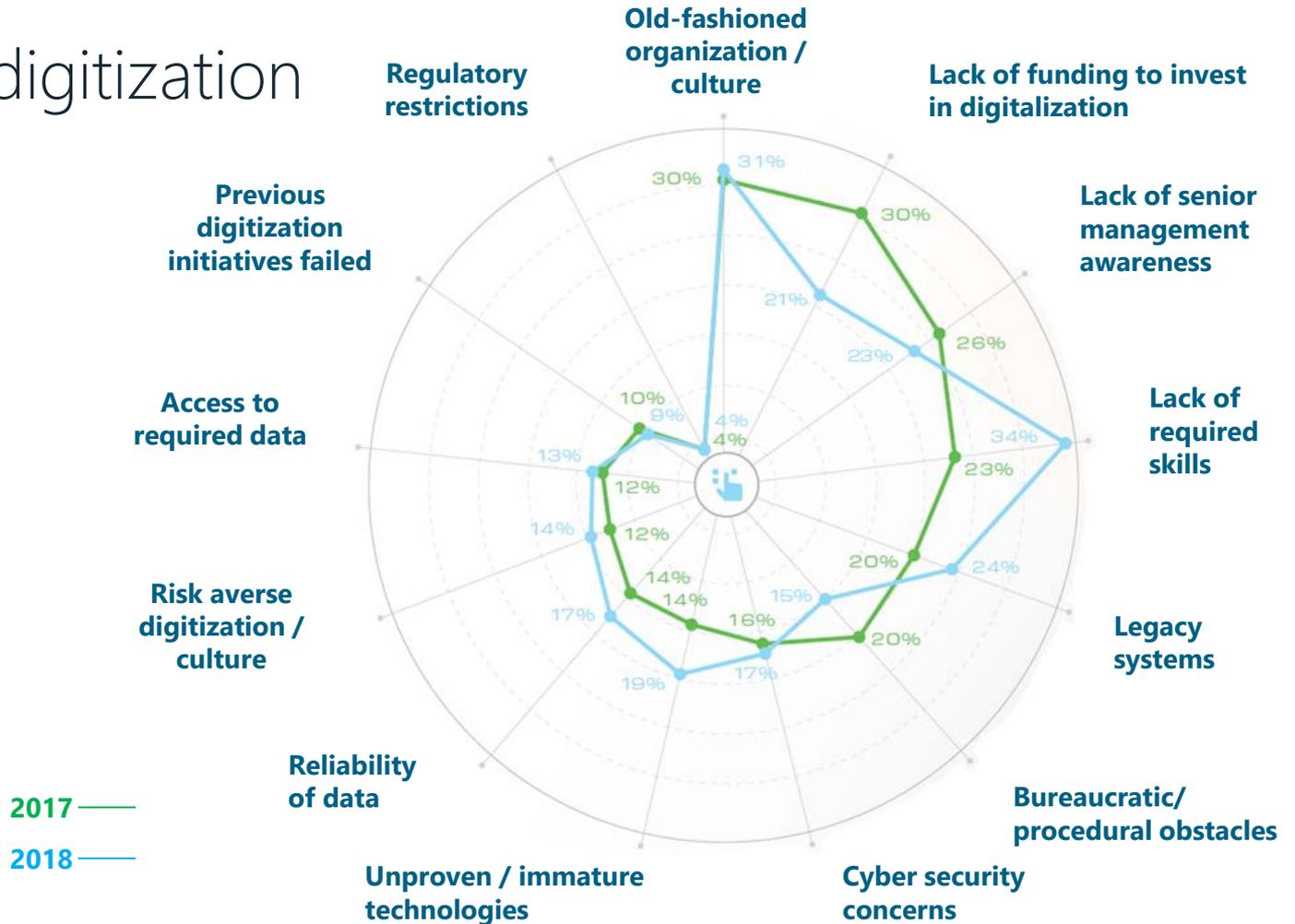


Source: FIATECH (Now part of CII)



*These aspirational targets from FIATECH. It is important to note that every organization is at a different level of sophistication and employs these concepts to varying degrees, so it is not realistic to anticipate that every organization can achieve these levels from where they are at today.*

# Barriers to digitization





## Defining Future State...

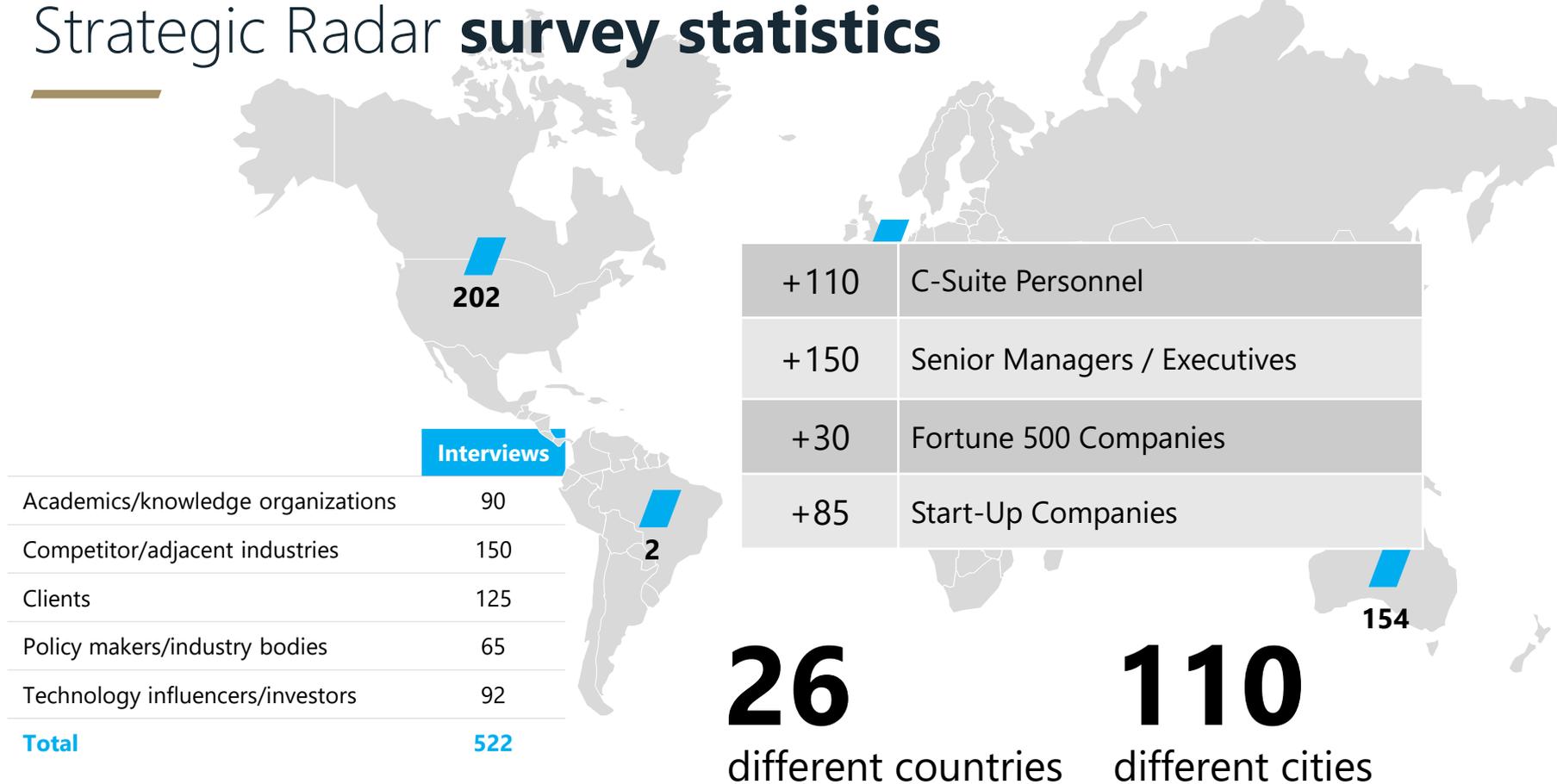
# Start with Key Questions?

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What is the future of the project delivery process?

**How will disruptive technologies** including digitalization, advanced analytics, intelligent process automation and artificial intelligence **come together to shape our industry, and the industries we serve?**

# Strategic Radar **survey statistics**

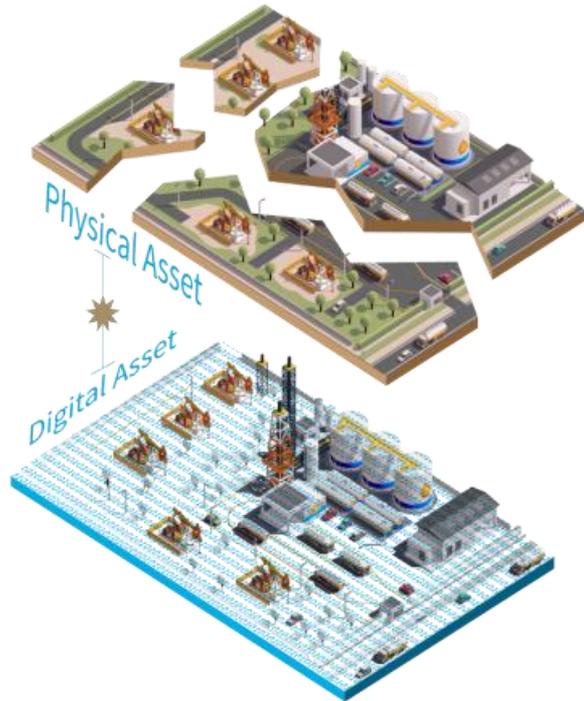


# 5

emerging  
technologies  
examined



# Risks of Status Quo



## Disconnect of digital and physical asset



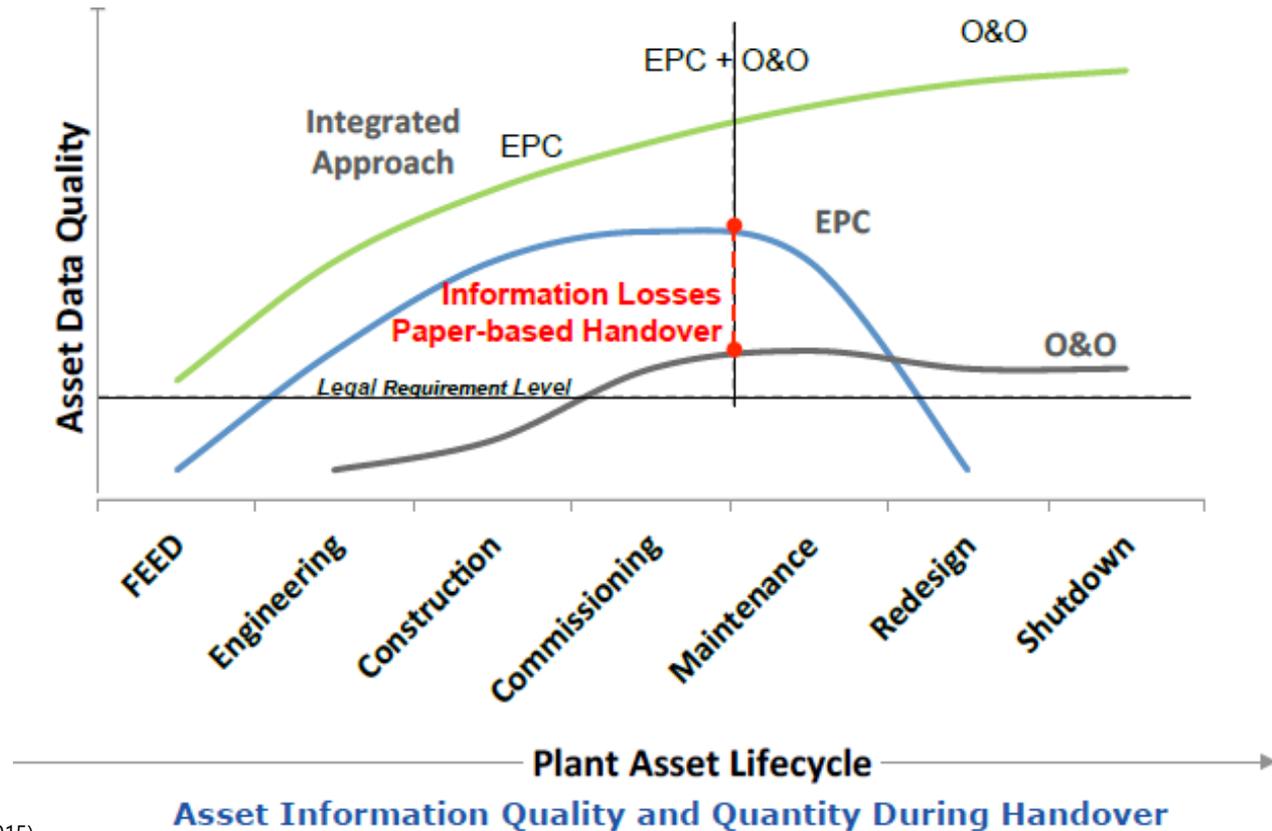
## Inefficient practices



## Sub-optimal business outcomes



# Risk of Status Quo – Information handover



# Digital asset for the whole lifecycle

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## Planning

Information governance defined at the start of a capital project that can be maintained through to operations thus futureproofing the digital investment

## Asset build/ Data handover

A single environment provided with all of the customers standards included; reduced time and cost of on boarding an EPC and increases the likelihood of a high quality handover.

## Operations

Increased integrity of operating facility at reduced effort  
Correct, complete and available information during operations can add significant efficiencies in labour cost and the timeliness and quality of decision making.

A woman with long dark hair, wearing a patterned jacket, is shown in profile, pointing her right hand towards the right side of the frame. She is looking intently in that direction. The background is a blurred office environment with modern lighting fixtures and architectural elements. The entire image has a blue color cast.

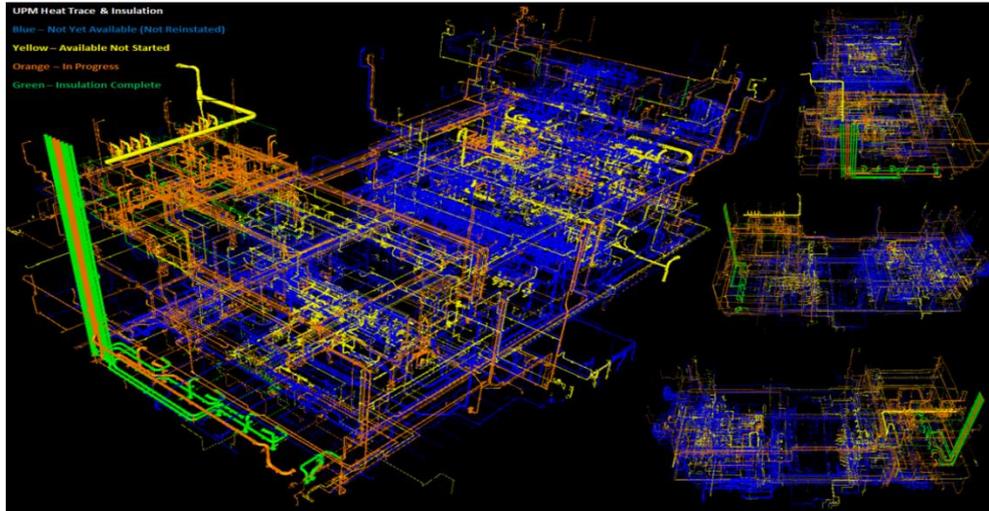
**Technology alone  
not enough....  
change behaviour,  
operating systems  
and business  
processes**



# Advanced Work Packages– 5D Implementation

Progressive Inspection of Advanced Work Packages  
Visualization of work pack status based on recorded progress

Use of the 3D model enables easy navigation  
to relevant part of plant



Recorded progress can be entered directly into  
mobile device and uploaded to central database



# 3D Printing & Additive Manufacturing

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3D Printing and Additive Manufacturing can facilitate both:

- spares virtualisation that will reduce inventory holding cost, and
- agile manufacturing of innovative solutions that will raise plant availability through attacking the causes of unplanned downtime and the duration of planned outages.



# Digital Technologies - Disruption or Progress

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The largest taxi-company in the world doesn't own a car



The largest accommodation services provider doesn't own a single flat



The most aggressive dealer doesn't own a warehouse

**With this level of change in last 5-10 years what does Appalachian region look like in 5, 10 or 20 years?**

# Forge the Future

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Forge The Future is a project of Pennsylvania businesses committed to activating energy-enabled economic growth that has the potential to transform the Commonwealth's slow economic and population growth to sustained, broad-based prosperity for all Pennsylvanians.



...successful development of downstream industries holds the potential for significant economic growth: a **\$60 billion increase** in PA GDP, more **100,000 jobs**, **\$2 B** in new state tax revenue, and a **4.5 trillion cubic feet** increase in gas demand

# Five Development strategies

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1. **Heat and Power Generation:** Ensure all PA consumers and businesses feel the benefits of low-cost gas for heating and efficient power generation, enabled by intrastate pipelines and distributed power generation.
2. **Petrochemicals:** Build a world-class petrochemical hub with ethane crackers, PDH plants, ammonia plants, and inorganic chemical plants.
3. **Advanced Materials:** Become the leading materials supplier for US Northeast infrastructure growth and establish commercial hub of advanced materials technology.
4. **Advanced Manufacturing:** Achieve a national "Top 3" position in data-hungry advanced manufacturing focusing on PA's leadership in robotics, artificial intelligence, and additive manufacturing.
5. **Export and Infrastructure:** Ensure PA always has enough outlets for its gas to keep production viable, signaling that PA competes on a global stage and is a lucrative destination for investment capital.

# #3 - Advanced manufacturing

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As a key member of the Forge The Future organization, *Advisian* will be helping Pennsylvania address its desire to become in the national "Top 3" in advanced manufacturing.

What needs to be done:

- Create district energy zones where long-term power purchase agreements would incent use of natural gas-fueled microgrids for manufacturing facilities.
- Support site developers and infrastructure expansion to deliver gas to sites manufacturers want to occupy.
- Review all programs and resources being devoted by state government to economic development and energy incentives.

"...Achieve national "Top 3" position in data-hungry advanced manufacturing focusing on PA's leadership in robotics, artificial intelligence, and additive manufacturing."

# Employment and labor needs

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Although Pennsylvania is home to experienced manufacturing and technology expertise, it is also facing several challenges:

- **A shrinking workforce:** Since June 2017, the state's labor force has declined by 61,000 people (caused by retirements and people giving up looking for work)
- **Competition:** Other states/regions are experiencing economic growth that is outpacing PA and are growing their populations in tandem with strong GDP
- **Budget:** Rising costs, an underperforming economy, and low population growth leaves PA with more legislative battles over budget and less opportunity to address vital community needs

"The full benefit of PA's energy resource will only emerge when the state's natural gas supply is met by robust and sustained local demand – the downstream sectors that will multiply GDP, jobs, and government revenues."\*

# What needs to be done

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- **Increase coordination** of state agencies, private companies, educational institutions, and foundations
- **Align labor needs** with education to pinpoint gaps in the workforce, **identify future demand**, and create tailored curriculum to enable the workforce to gain the needed skills for these new jobs.
- **Enhance and modernize career and technical education programs**, elevating them to magnet programs focused on **training the state's workforce of the future**.
- **Share best practices**: several of PA's institutions have programs focused on the oil and gas industry. PA needs to share those best practices/programs, while encouraging recruitment.

# The Digital journey

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- Digitization and technology initiatives are facilitating productivity gains
- Sharing of knowledge across Industries to learn and challenge status quo
- Collaborative Owner – Supplier relationships are essential
- Invest in training and development for industries of future
- Small yet pragmatic steps needed
- Ask better questions, collaborate and innovate
- Digital Transformation is a journey, not a destination



# Advisian

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