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Legally Enforceable Field Automation: Lessons Learned From the Water Hauling Supply Chain

PIDX Spring Conference

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Content

- It’s all started 3 years ago with PIDX Field Ticket Workgroup
- A paradigm shift, not another e-field ticketing solution
- Automating the water hauling order-to-cash process
- Legally enforceable automation
- Some lessons learned
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It all started 3 years ago with the PIDX Field Ticket workgroup

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The place to go for oil and gas e-business standards

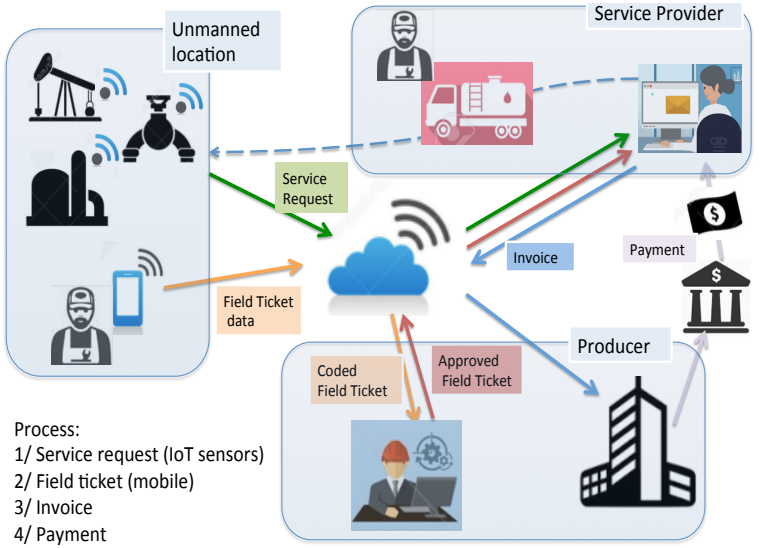
Unmanned location field ticketing

PIDX field ticket group workshop

18 February 2016

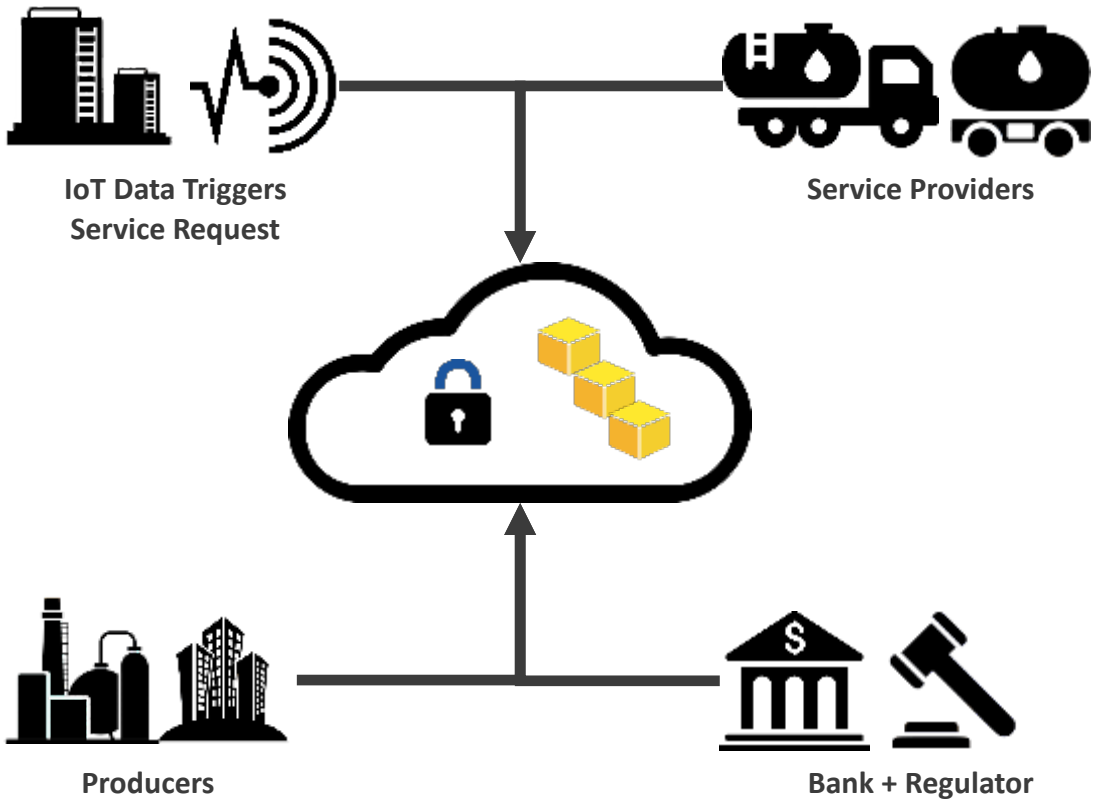
Recommended Best Practices	Phase 1: Tag all assets (wells, tanks, etc) Provide simple devices to field personnel to identify asset and capture light field ticket data (quantities, time) Leverage cloud based technology for coding (asset based tag) and approval (portal) Phase 2: Leverage IoT sensors to automate the process end-to end

E-field ticket for unmanned locations



Process:
1/ Service request (IoT sensors)
2/ Field ticket (mobile)
3/ Invoice
4/ Payment

A paradigm shift, not another e-field ticketing solution



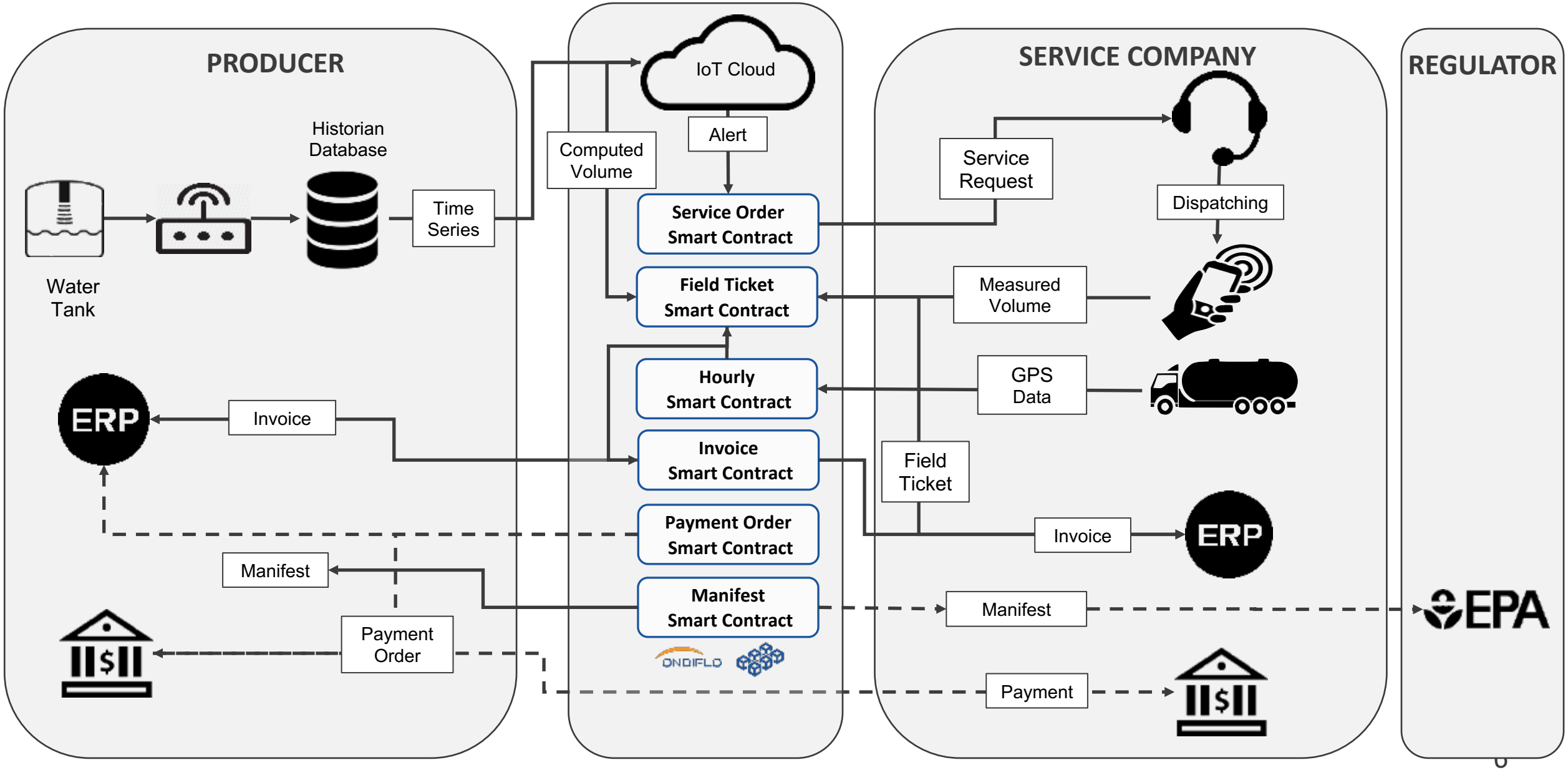
Data Flow

- Field Data (Sourced from IIoTs or SCADA when Possible) Are Captured in Blockchain
- Orders and Tickets Are Created Via Smart Contracts and Pushed to Trading Partner Workflows
- Invoices Are Captured in Blockchain and Trigger Payments and Associated Trade Financing
- Documentation Can Also Be Generated Via Smart Contracts and Pushed to Regulators

A paradigm shift, not another e-field ticketing solution

- **End-to-end integration from the field to the back-office**
  - Real time flow of field generated data in back-office process and associated systems
- **All participants get access to the same data at the same time :**
  - Distributed ledgers lead to trust between trading partners
- **99% of the field tickets are automatically approved:**
  - No reconciliation- maximum efficiency
- **Payment approval is based on proof of service delivered:**
  - Toward an invoice-less world
- **Service and payment can be completed in few days maybe even the same day**
  - Massively reduced DSO and need for working capital

Automating the water hauling O2C process



Legally enforceable automation: the technology to enable it

What it is not:

- A public Blockchain infrastructure based on mining
- An inhouse developed Blockchain protocol
- A crypto currency/ private token based solution

What it is:

- A private permissioned Blockchain leveraging Ethereum with Proof of Authority (PoA)
- A suite of smart contracts allowing full automation of the Procure-to-Pay process
- An Open API leading to easy onboarding of new systems and trading partners
- A flexible enterprise governance mechanism for validation of blocks
- A suite of security services enabling obfuscation of transactions

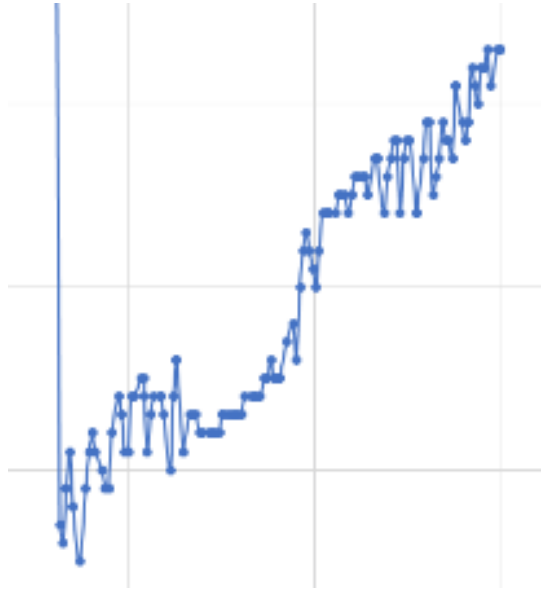
Legally enforceable automation: capturing key data in blockchain

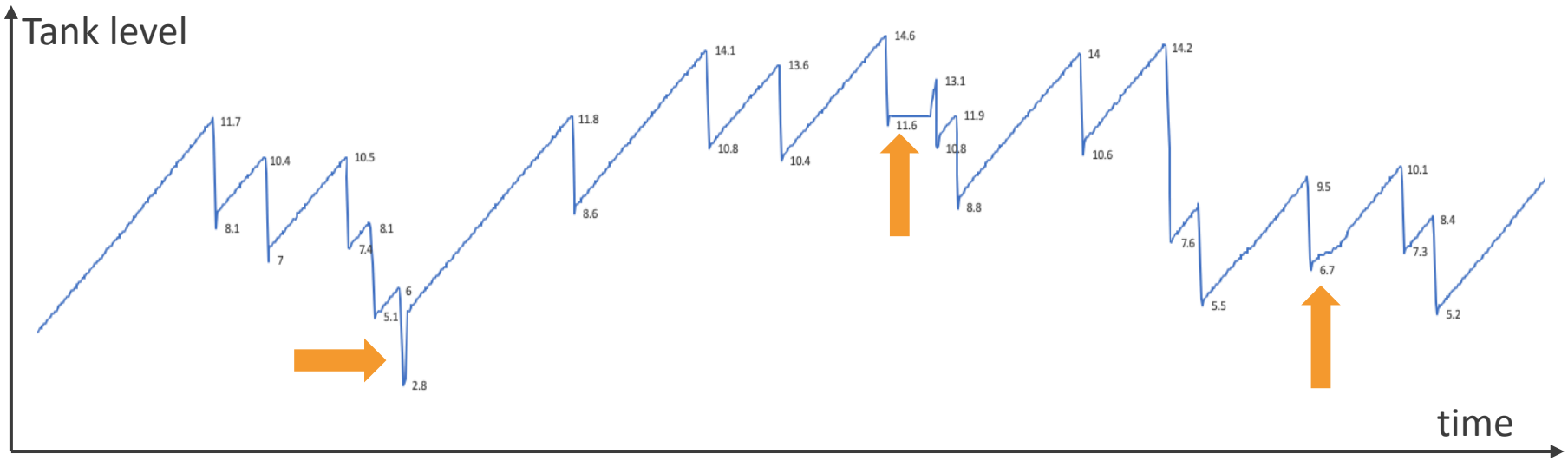
- **Example of data captured in blockchain**
  - Service requests (time when sent, tank level when sent)
  - Acknowledgements of job accepted, driver allocated
  - Time stamped tank levels for start and end of filling/ hauling phases
  - Time when crossing geofence (at well or SWD)
  - Computed volume hauled, discharged
  - Supporting documents (photos of slips, road incidents, etc..)

Lessons learn: it’s all about data

- **IoT data quality- Splash effect-**

  Computed volume accuracy





Lessons learned: automation but not only

- **Field operations don’t always follow the script**
- **The solution provides**
  - Flexibility in the job scheduling
    - Dispatcher needs to increase the number of loads during the day shift because one driver was not available during the night shift
- **Or workarounds in case of Scada data interruption or increase in well flow rate**
    - Manual creation of service requests
- **On/off connectivity impacts the mobile app performances and needs to be anticipated**
  - Syncing, geofencing, etc..

Lessons learned: adoption and system integration

- **Dispatchers:**
  - Almost real time visibility on tank levels, forecast of future SR needed (as predicted by the solution) lead to much better scheduling, the dispatchers love it
- **Truck drivers:**
  - Great adoption of the mobile app
  - Like the idea of having most FT automatically and quickly approved – leading to quicker pay for them
- **Operator IT team**
  - Learning curve in delivering field data to an external system (API)
  - Assessing the cost of transferring massive volume data

In conclusion: it works!

- **Full automation of the O2C process for water hauling and any fluid hauling from and to the well can be achieved today**
- **The integration of IoT/ cloud/ mobile and blockchain appears to be a very viable way to do it**
- **It creates value both for producers and service companies**
  - Objective: reduction of the cost of a single transaction from 80 /100$ to 10/20$
- **This technology is built for the shared economy and the full value will be delivered if the adoption is massive and easy**
- **Easy Onboarding of all participants (big and small) requires**
  - Adoption of Standards (PIDX field ticket for ex.)
  - Open API

In conclusion: but governance to be addressed

But more work is needed at the network governance level (OOC consortium)

- **IT**
  - Node participation in a shared network: hosting, certification
  - Validation ability: round robin approach for validation nodes
  - Network growth: adding/ removing participants
  - Islanding and security breaches in a shared network
- **Legal**
  - Legal enforceability of smart contracts among participants, with regulators and auditors
  - SLAs
  - Privacy policy/ NDA to prevent decryption of data inside nodes

Q&A

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