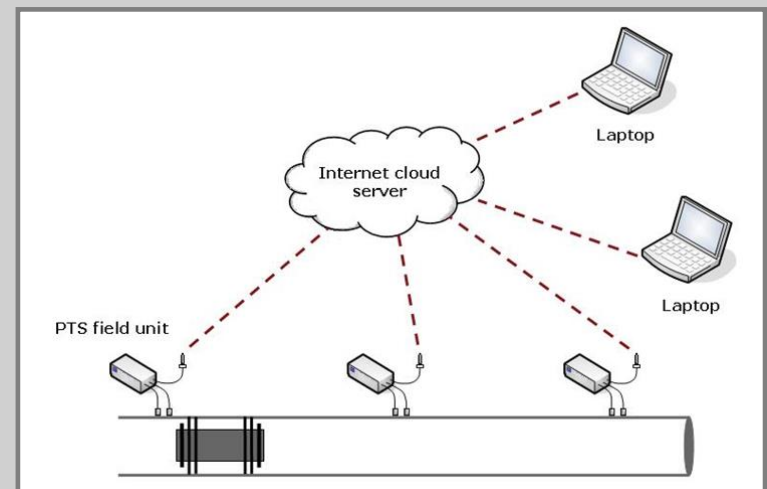


Development and implementation of a real time pig tracking system.

Jelle Krouwel, N.V. Nederlandse Gasunie

IGRC Copenhagen, september 2014



Goal and agenda of presentation

- Goal
 - Inform about development of new tool
 - Share some lessons we learnt
- Agenda
 - What pigging is
 - Why tracking pigs is important
 - How we did it in the past
 - What we learnt along the road
 - Final product

Pigging




16" Inspection pig, photo courtesy of Baker Hughes PMG

Keeping track of pigs is important

- Tracking information: pigs current speed and position.
- Position information is used for:
 - Keep track during run
 - Estimate arrival time
 - Operate valves, etc.
 - Locate stopped/ stuck pig and determine appropriate actions
 - Direct search effort for lost pig
- Speed information: intelligent pigs work best within a certain speed range. Utility pigs ?
- More important in complex grids, smaller diameters, first run.

Pig tracking: previous approach Gasunie

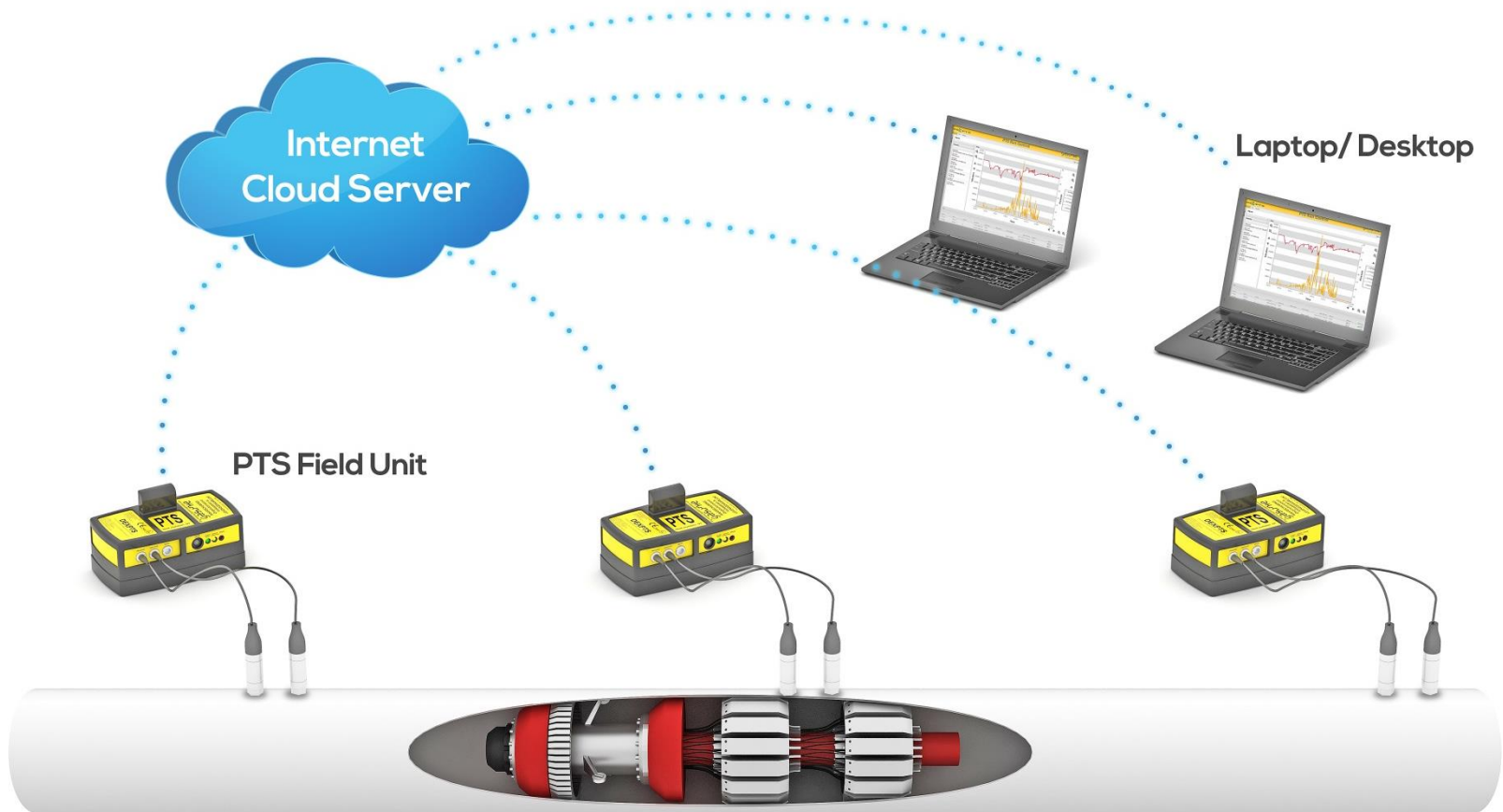
- Run leader + mobile tracking crew
- Tracking crew: on valve stations with geophones and pressure transmitters.
- Speed is derived by interval between audible weld passage 
- Speed is derived by valve station passages (line section)
- Station passage and estimated speed is transmitted by telephone
- Run leader has to process this information for decision making

- Disadvantages:
 - Information is subjective, incomplete and delayed
 - Laborious process

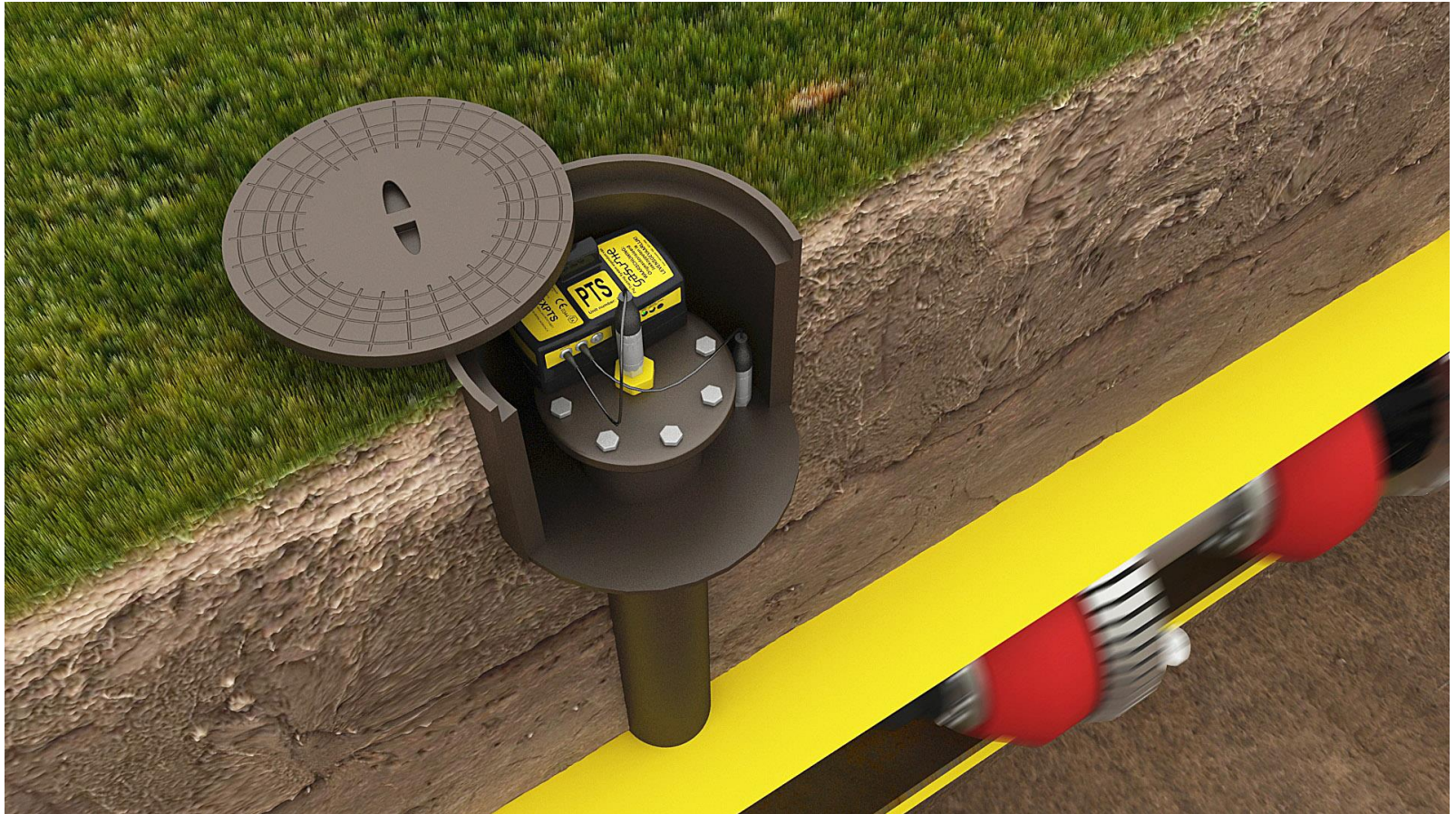
Some crucial points during the development

- The initial **idea** of combining a geophone with a telephone was the start of the project.
- Project **took** way **longer** than anticipated (first estimate: half a year, realisation two year).
- We needed **more money** than anticipated ;-(
- Transmitting processed data in stead of audio (**teach computer** how to distinguish welds from noise).
- Hold point: change of contractor; Brutal but Brilliant!
- ATEX certification for small batch of units...
- Different power modes to increase battery life

PTS System lay out



DexPTS field unit



The screenshot displays the 'PTS Run Control' interface. At the top, the 'gasunie' logo and 'crossing borders in energy' tagline are visible. The main window title is 'PTS Run Control'. Below the title bar, there are tabs for 'Pig runs', 'Pts', and 'Version'. The left sidebar contains a 'Pig runs' section with a list of events for 'Pig run : W-533-01'. The central area features a data visualization graph with two y-axes: 'Vibration' (0-400) and 'Pressure (Bar)' (35-40). The x-axis shows time from 12:56:03 to 13:03:03. A legend on the right identifies data series for Vibration (V) and Pressure (P) for units PTS01 through PTS05. A 'Live' button is present below the graph. At the bottom, the 'Units command centre' table lists five units with their status and location.

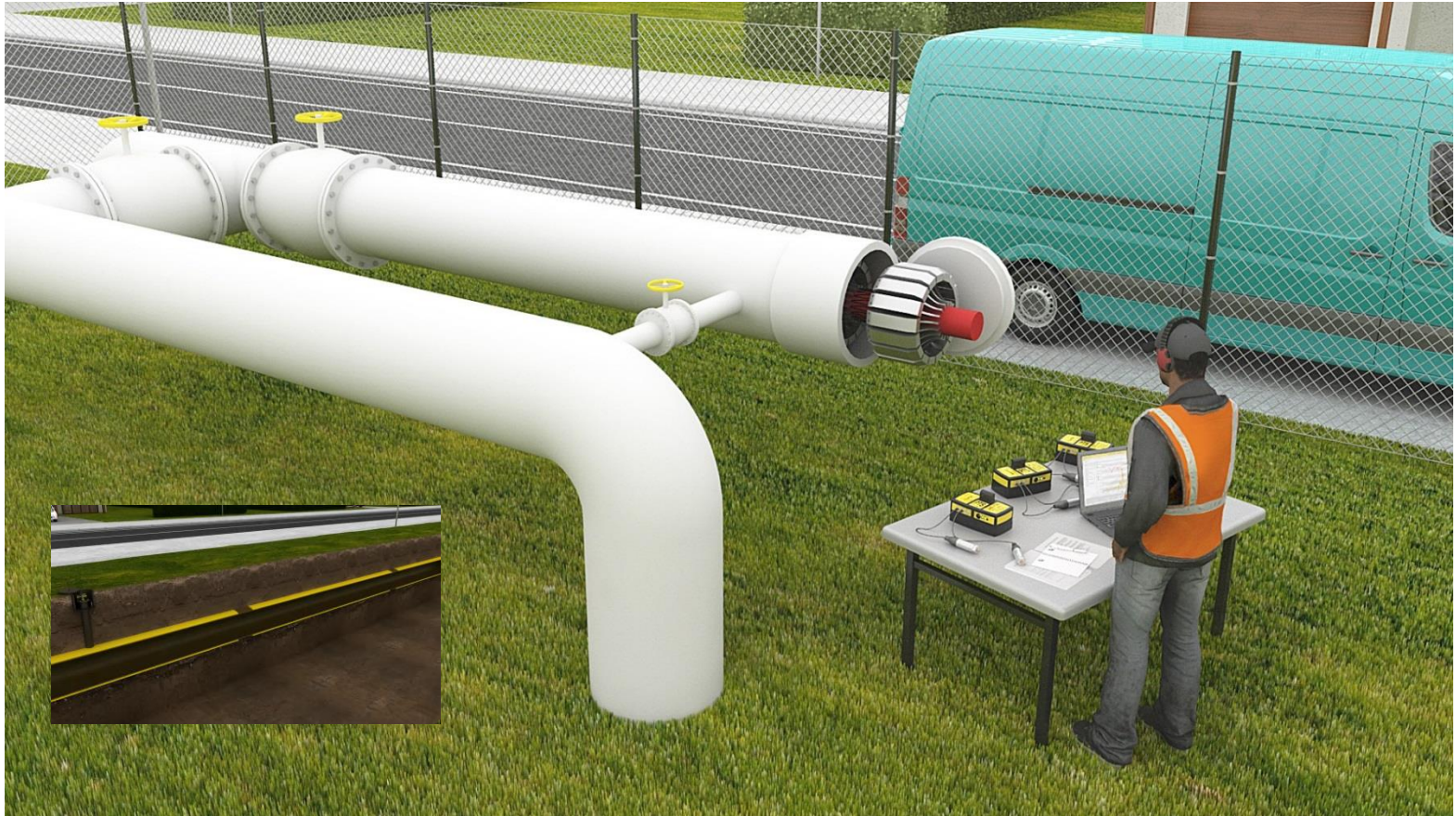
data visualisation, weld passage & pressures

operators log

units command centre

Unit	Name	Ord...	Location	Distance	Last status update	Current status	Pending command	WakeUp	Battery	Network	Error
500010	PTS01	1	S-6368 Nieuwe Cralloseweg	0	06/11/2014 07:02:00	Sleep	Stand-by	06/11/2014 07:41:06			
500011	PTS02	2	S-6370 Franse Kampweg	0	06/11/2014 06:56:00	Sleep	Stand-by	06/11/2014 07:41:42			
500012	PTS03	3	S-6409 Karnemelksloot	0	06/11/2014 07:40:00	Sleep	Stand-by	06/11/2014 07:42:29			
500013	PTS04	4	S-6450 Weesperweg Muid...	0	06/11/2014 07:17:00	Sleep	Stand-by	06/11/2014 07:43:45			
500014	PTS05	5	S-6397 Mulderstraatweg	0	06/11/2014 07:17:00	Sleep	Stand-by	06/11/2014 07:44:21			

Animation of system



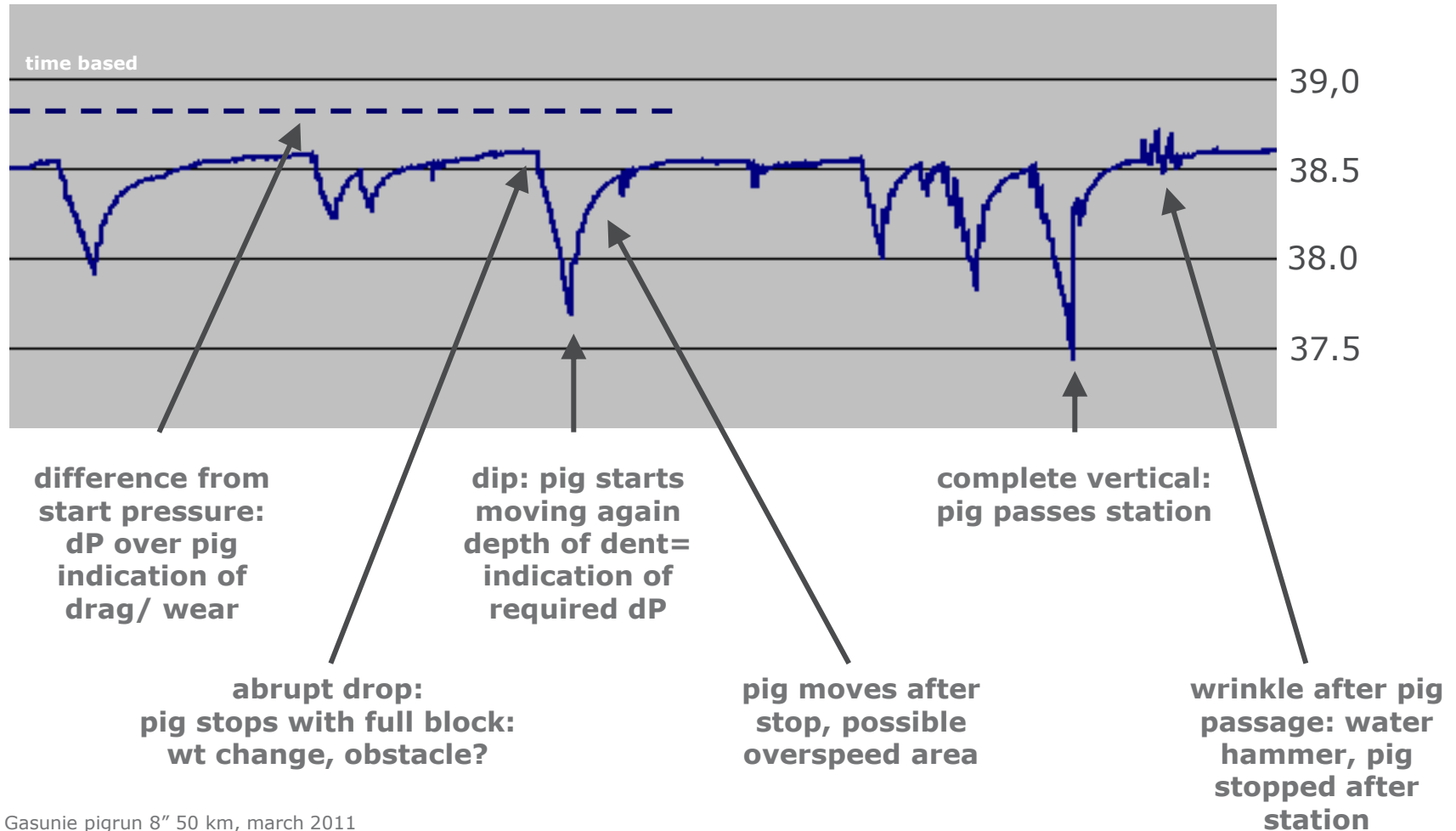
Thank you for your attention!

Additional slides

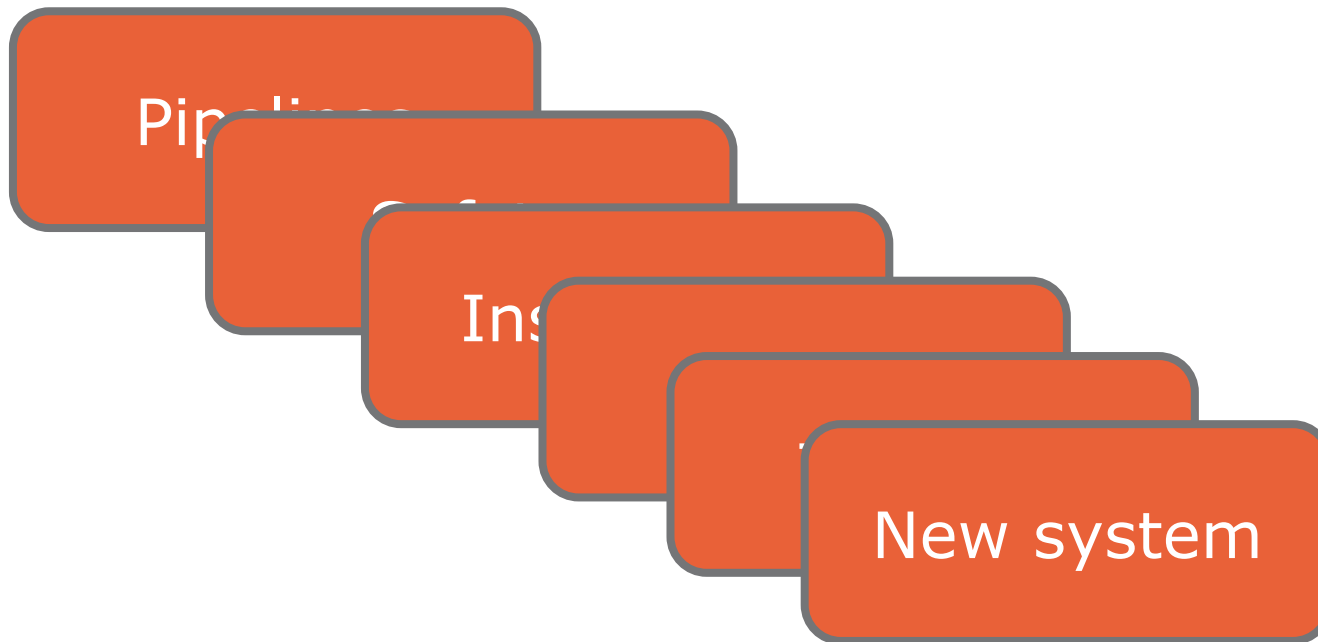
Additional points

- Range? Dependent on sensor mount!, medium, line pressure, diameter, type of pig, etc. etc.
- Range? Our rule of thumb: line diameter in kilometre (= safe)
- Very powerful tool but operator needs knowledge of pipeline, pigging and PTS system itself.
- Reduces manpower requirements significantly.
- Subject to theft?
- Increases sense of control, success rate of runs.
- As all stops are visible you might become nervous...
- Installing the units requires manpower.
- Some issues in area's with poor GSM network coverage.

What detailed pressure visualisation can tell



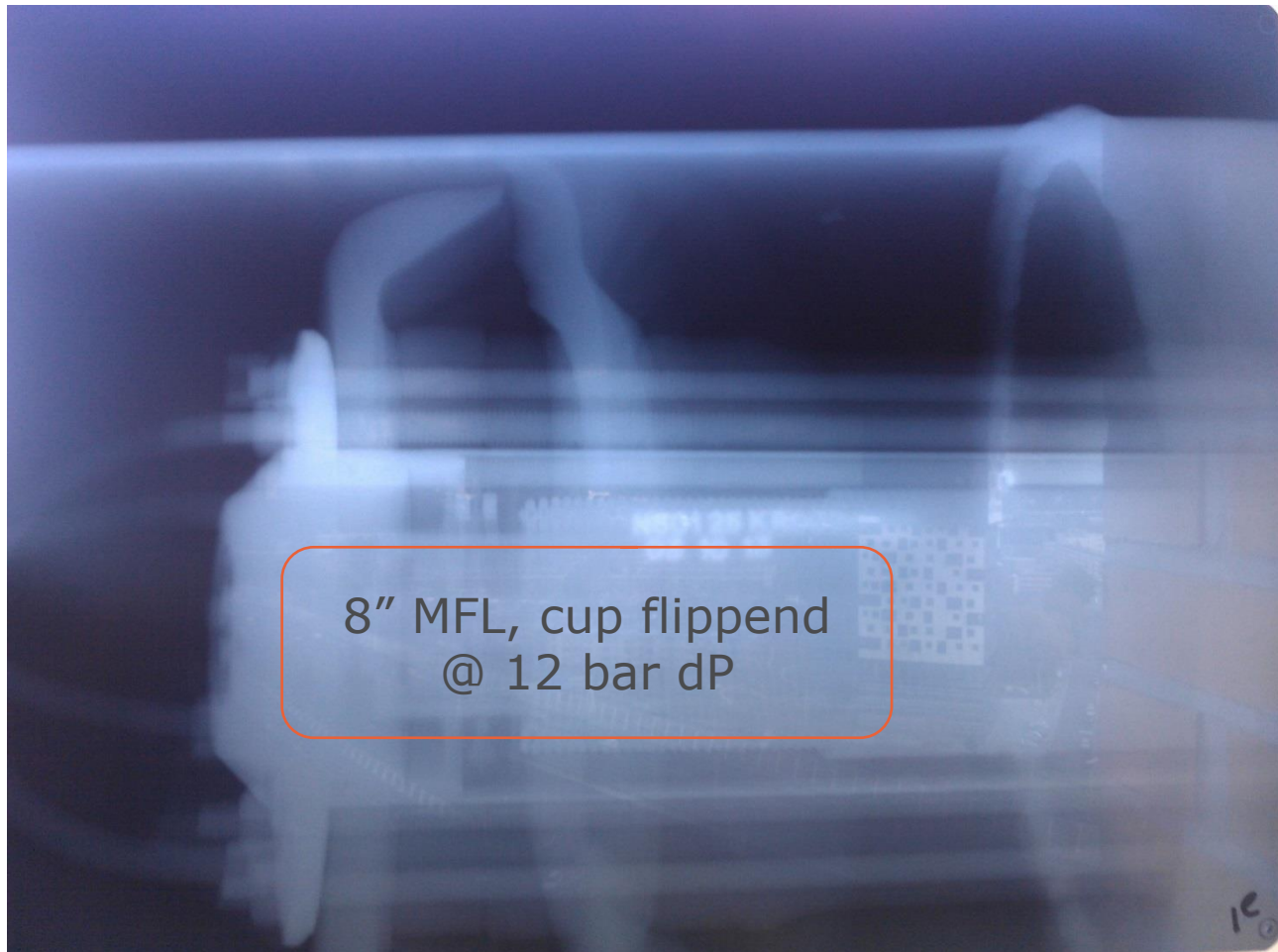
Recap: Pig Tracking System?



Typical valve pit where unit will be placed



Stuck 8" pig located spot on with PTS



(part of) Gasunie 40 bar grid (all piggable)

