WISE x ACCENTURE CASE COMPETITION

February 2023

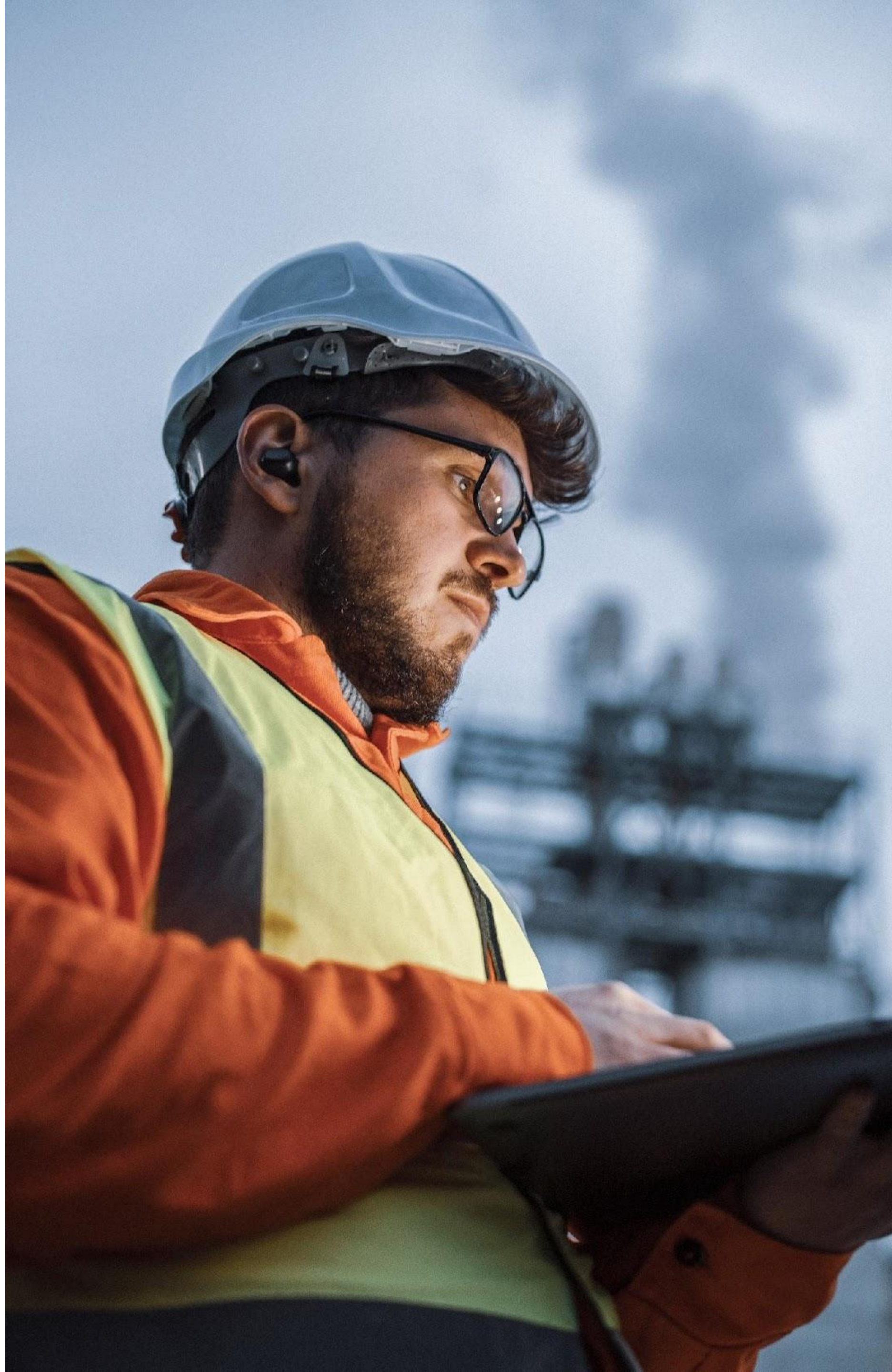
Client Background

The client, **XYZ Energy** is an integrated oil and natural gas company headquartered in Calgary. They own upstream assets and refineries across Alberta. The client has engaged your team to co-create a Proof of Concept (POC) IoT solution to enhance their upstream, midstream, and downstream operations. The budget they have is $6 million and they are looking to implement the POC that will have the highest return on investment for their business.

The client has brought in your team to prepare a business case to help them determine the optimal use-case to be implemented for each Business Unit in this POC. Given the strong value proposition of each use-case, the client does not want to allocate any more than $3 million to a single Business Unit. In addition to the business case, the client would like to see a list of requirement specifications to determine what the stakeholders need from the IoT solution. Alongside the requirements discovery, XYZ's technical team is asking your team to create a high-level technical design for each of the selected use cases. Understanding the importance of project management within any POC, the client has asked for a high-level implementation timeline to help the leadership team begin mobilizing resources internally.

Key Deliverables

1. Determine the optimal use-case to deploy at each Business Unit, accompanied by the use-cases' financial prospect
2. Perform *functional and technica*l requirements gathering for each of the selected use-cases (see Exhibit A for reference)
3. Create a high-level technical design for each of the selected use-cases (see Exhibit B for reference)
4. Provide a high-level implementation timeline with key activities for each Business Unit (see Exhibit C for reference)



Overview of 5G & Applicability to the Energy Industry

The **speed** at which 5G connects devices is unparalleled. Major global telcos have proven speeds greater than 2 gigabits per second, which is 10-100x current speeds

Enhanced **responsiveness** of devices connected to 5G makes latency an issue of the past. In optimal environments, data transmission over 5G can take less than 1/1000th of a second

5G brings greater **speed, responsiveness**, and **capacity** than we have ever experienced

Expanded **capacity** of devices that can be connected is a major enabler for 5G. Where 4G can connect 100,000 devices per square kilometer, 5G can connect 1,000,000, thus enabling greater potential in IoT technology

5G Use Cases Within the Energy Industry

Leakage Detection	Real-time pipeline leak detection is an essential task, which can be simplified by IoT application in the energy industry. Smart leakage sensors together with a real-time alert system reduce the risk for companies that deal directly with extracting and transporting oil and gas.
Predictive Maintenance	Predictive maintenance is a maintenance strategy that involves using IoT to gather and analyze data about equipment or machinery. Sensors and other collect data about equipment status to detect any issues that may need to be addressed to prevent future outages and unnecessary downtime.
Connected Worker	Equipping field workers with wearable devices to enable instant communication and increased safety especially in remote locations. Real time connectivity between workers in the field and the office to address and solve mechanical issues that arise in the field.
Intelligent Operations	Intelligent operations enables operational efficiencies through optimized utilization of assets and resources. Within the energy sector, such examples include optimized value chain, smart transportation, storage facilities and distillation, all of which aim to reduce operational spend.

XYZ Company Figures in Upstream

Below are the composition, production, and event figures that XYZ co. has reported for their upstream business. Use these figures to determine the optimal use-case for XYZ's upstream business.

Upstream			
Barrels Extracted/day	200,000bpd	Cost of Ground Leak-detection Methods	$1,200 per facility
Daily Site Shifts	750	Cost of IoT Aerial Scanners	$528 per facility
Safety Incident Rate	0.0054795%	Materials and Maintenance Cost	15% of OPEX
Avg. Safety Incident Cost	$1,200,000	Delivery Logistics Cost	10% of OPEX
Days Lost to Downtime/year	27 days	Profit Margin	20%
Daily Operating Cost	$1,600,000	Number of Upstream Facilities	500
		Oil price (WCS)	$65/bbl

Use-Cases in Consideration

 **Predictive Maintenance**	During unplanned downtime, company XYZ loses the **entirety** of its unrealized production revenue. A $1,000,000 spend in predictive maintenance will equip **0.15%** of its production assets with IoT enabled devices that will eliminate unplanned downtime for these assets completely.
 **Connected Worker**	Workers are exposed to a high degree of risk while running upstream operations. A $1,000,000 spend in this segment will equip **2.5%** of their upstream employees with IoT devices, eliminating all safety incidents for said employees.

What is Upstream in Energy?

Upstream refers to the early operational stage in energy's value chain. Primary activities within upstream include exploration and development, production, and extraction. At the upstream site, energy is furthest away from the end customer/consumer of the energy.

XYZ Company Figures in Midstream

Below are the composition, production, and event figures that XYZ co. has reported for their midstream business. Use these figures to determine the optimal use-case for XYZ's midstream business.

Midstream			
Barrels Transported/day	50,000bpd	Cost of Ground Leak-detection Methods	$1,200 per facility
Daily Site Shifts	10	Cost of IoT Aerial Scanners	$528 per facility
Safety Incident Rate	0.0068493%	Materials and Maintenance Cost	15% of OPEX
Avg. Safety Incident Cost	$1,200,000	Delivery Logistics Cost	20% of OPEX
Days Lost to Downtime/year	15 days	Profit Margin	20%
Daily Operating Cost	$400,000	Oil price (WCS)	$65/bbl

Use-Cases in Consideration

Leakage Detection	Currently, company XYZ spends around **16 Million** on mitigating pipeline leaks. A $1,000,000 spend in leakage detection within the midstream sector will help the company reduce spill sizes by **1.5%** and likelihood of spills by **1.5%**. See Appendix A for more information regarding XYZ pipeline leaks.
Predictive Maintenance	During unplanned downtime, company XYZ loses the **entirety** of its unrealized production revenue. A $1,000,000 spend in predictive maintenance will equip **1%** of its production assets with IoT enabled devices that will eliminate unplanned downtime for these assets completely.

What is Midstream in Energy?

Midstream connects an integrated energy company's operations by storing, transporting, and marketing the energy products extracted upstream. While midstream can include a broad range of distribution means such as ship tankers, XYZ's midstream operations are refined to pipeline and storage.

XYZ Company Figures in Downstream

Below are the composition, production, and event figures that XYZ co. has reported for their downstream business. Use these figures to determine the optimal use-case for XYZ's downstream business.

Downstream			
Barrels Refined/day	100,000bpd	Cost of maintenance for mobile leakage detection	$6,736 per device/year
Daily Site Shifts	500	Coverage of mobile leakage detection	1 acres/device
Safety Incident Rate	0.0027397%	Materials and Maintenance Cost	15% of OPEX
Avg. Safety Incident Cost	$1,200,000	Delivery Logistics Cost	15% of OPEX
Days Lost to Downtime/year	30 days	Profit Margin	20%
Daily Operating Cost	$1,600,000	Refinery area	600 acres
Existing leakage system cost	$4,500,000 /year	Oil price (WCS)	$65/bbl

Use-Cases in Consideration

Predictive Maintenance	During unplanned downtime, company XYZ loses the **entirety** of its unrealized production revenue. A $1,000,000 spend in predictive maintenance will equip **0.25%** of its production assets with IoT enabled devices that will eliminate unplanned downtime for these assets completely.
Intelligent Operations	Intelligent operations can transform logistics and improve operations, particularly delivery logistics and material supply. A $1,000,000 spend on enhancing operations' connectivity can reduce material and maintenance costs by **0.2%** and delivery logistics cost by **0.35%** annually.

What is Downstream in Energy?

Downstream operations are the stage in an energy company's value chain where they are closest to the end consumer. This stage is primarily focused on processing and refining energy products into their ultimate end uses such as gasoline, jet fuel, diesel, and more.

Stakeholder Considerations

Chief Executive Officer

Wants to ensure that the chosen POC strategy enables meaningful cost reduction in the short term and can be sustainably rolled out to the rest of XYZ's operational sites

Chief Financial Officer

Interested in how the deployed technology could enable additional cost transformation given the company-wide cost reduction agenda

Chief Technology Officer

Is curious to know how the underlying technology can enable future digital transformation initiatives outside of the use cases mentioned here

Chief Operating Officer

Has prioritized site worker safety for the upcoming fiscal year and is hoping to use this POC as a starting point for future investments in the space

Appendix A – Yearly Pipeline Leaks

Table 1: Company XYZ pipeline annual leaks

Spill Size (bbl)	Cost of Damages & Cleanup ($/bbl)	Number of Leaks Occurred	Average Spill Size (bbl)
Small: **238**	13,786	2	200
Modest: **238 – 2,380**	4,480	0.8	1,100
Average: **2,400 – 11,900**	1,861	0.4	5,500
Larger: **11,900 – 23,800**	1,034	0.2	14,350

Exhibit A: Sample Requirements Gathering Output

The following is a requirements gathering output example for a hypothetical Truck Scheduling Solution, covering both Functional and Technical Requirements

Functional Requirements
Depict solution or product features that a user can detect, or leverage to execute on a desired task

Technical Requirements
Define the technological specifications that the solution or product must fulfill, covering items like accessibility, availability, authorization, etc.

	ID	Requirement	Priority
Functional Requirements	FREQ.01	The solution shall create and import process orders (TPOs) that include source, destination, arrival and delivery times and allow for user-based comments.	Must
	FREQ.02	The solution shall send TPOs to the truck scheduling system.	Must
	FREQ.03	The solution shall be able to synchronize with TPOs created through the existing enterprise system.	Should
	FREQ.04	The solution shall import all the required information on currently running or scheduled trucks derived from the truck scheduling system. E.g., truck ETA, product, configuration.	Must
Technical Requirements	TREQ.01	The solution shall allow for cloud-based provisioning in XYZ's technical landscape	Must
	TREQ.02	The solution shall allow for integration with an Enterprise Resource Planner (ERP) to enable organization-wide sharing of information	Should
	TREQ.03	The solution's software shall allow for remote servicing by personnel physically located elsewhere	Could
	TREQ.04	The solution shall support remote access for data consumption, entry, and manipulation from mobile devices (iOS, Android, etc.)	Should

Requirements gathering exercises typically involve interviewing key end-user stakeholders and bringing in expertise from industry and/or solution best practices. This is a sample requirements repository that could come out of such a discussion, including priorities for delivery.

Exhibit B: Smart airport IoT Solution Design

Sense

Smoke Detector Antenna – Detect smoke

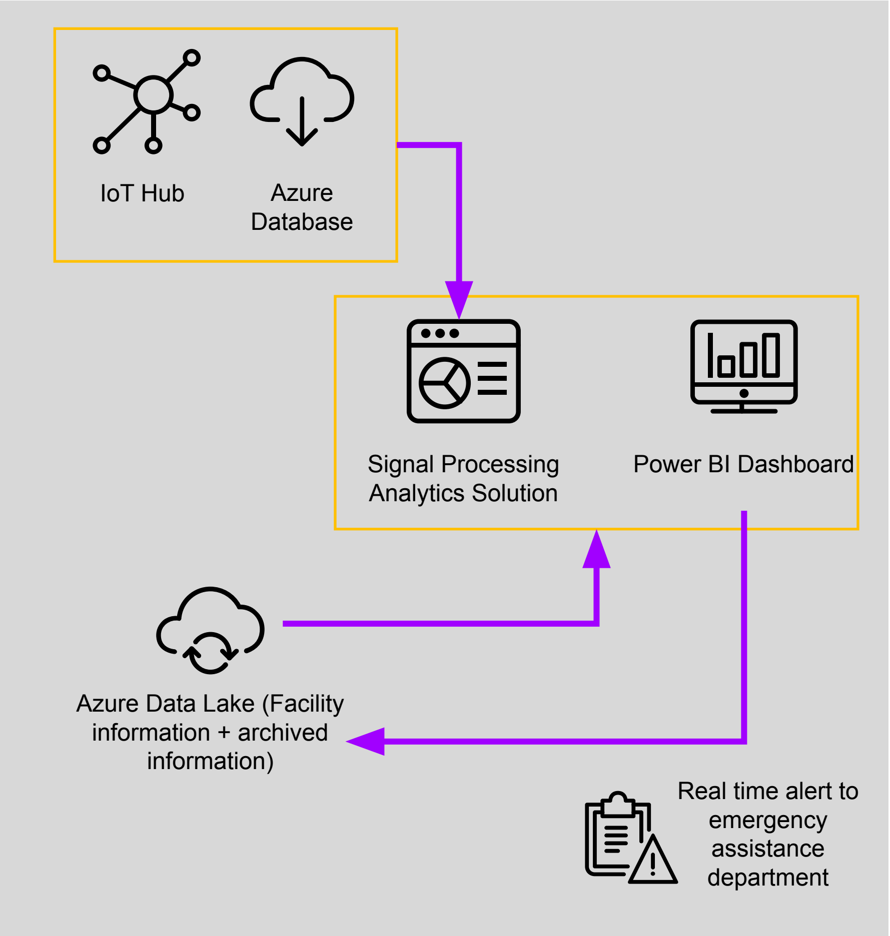
Human Presence Sensors – Detect all majorr/minor human movement on a stairwell

RFID Tags – Connected to IoT hub which can be sensed by mobile RFID readers

Beacons – Sense and send push messages and notifications

Video – Footage and input to be analyzed

Comprehend & Analyze



Act

Example:

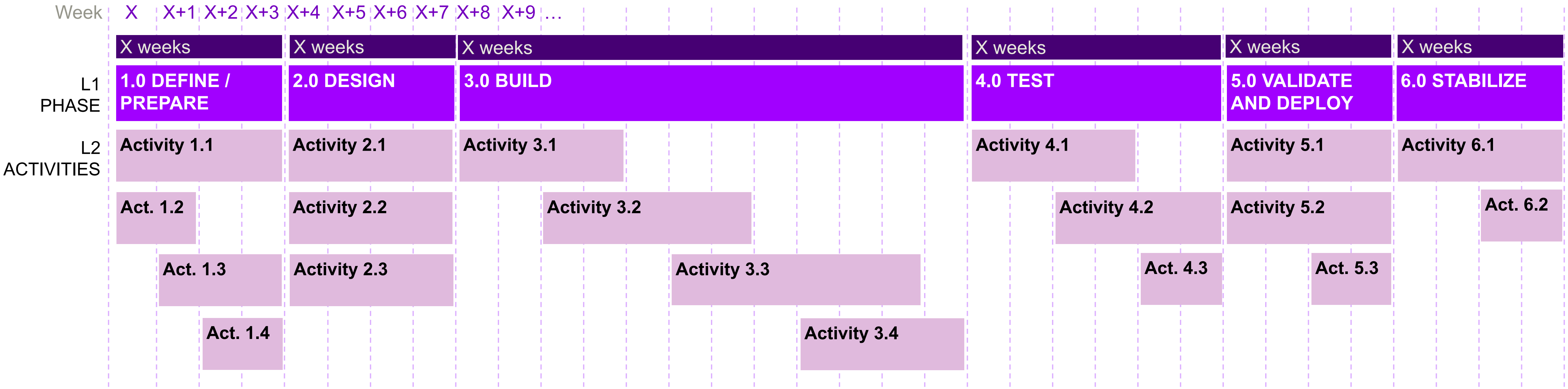
Real time alert messages to airport team and external hospital emergency system

Real time push notifications for offers and discounts

Police/security staff to be informed to take action

Exhibit C: Project Timeline

A sample timeline/roadmap is provided below as reference



Project timelines are organized by Level 1 (L1) high-level project phases that include a sequence of Level 2 (L2) activities to realize the project’s milestones and key deliverables. The time requirement for each activity is determined by the team’s resources, activity complexity and successful completion of dependent activities.

Exhibit D: Sample Timeline View

A sample timeline/roadmap is provided below as reference