



# Paperless Operations

How to build a business case for mobile apps



# Table of Contents

The Hidden Costs of Paper-Based Operations	3
In the Depot	4
Less Errors and More Productive Employees	5
Reduce Equipment Losses and Capture Damage Immediately	6
In the Warehouse	8
Fast and Accurate Goods Receipt	8
In the Field	10
Increased Equipment Utilisation and Rental Revenue	10
The Intangibles	12
Conclusion	14
About Spartan	14



## Introduction

Paper was invented by the Chinese over 2,000 years ago and it was the dominant communications technology until the early 20th century. Since then it has been gradually displaced by the telephone, radio, television, internet and, most recently, the Smartphone and the App Store.

Unlike the consumer market, industrial change takes time. Paperwork is still commonplace in environments such as Oil and Gas, Utilities and Equipment Rental.

In this white paper, we will expose the error, delay and cost that paper generates for industrial companies and how Mobile Apps can remove this unnecessary cost. We will present a clear business case that you can use to help convince your management team to rip up the paper and start again with mobile technology.

## The Hidden Costs of Paper-Based Operations

The core business of our customers is the efficient management of equipment and personnel to satisfy customer demand.

The customer may be internal, for example Balfour Beatty teams that require equipment to safely repair overhead lines. Or external, for example when FIFA require a fleet of Aggreko generators to power World Cup stadiums.

Managing equipment and people using paper introduces unnecessary waste, error and delay. Some of the costs we have identified and eradicated include:

- Wasted time by technicians, administrative staff and managers recording, transcribing and re-keying handwritten notes into back-office systems (as well as chasing paperwork across the operation).
- Lower equipment utilisation and lost revenue due to equipment being incorrectly marked as unavailable.
- Wasted journeys when field service staff cannot solve a customer problem because of missing equipment or incomplete job sheets.

In this white paper we look at parts of a typical operation where paperwork is leaking money and present a business case template for introducing mobile apps.

## In the Depot

Customer demand is typically captured by a back-office team (e.g. sales contact centre, logistics planners, order administrators) entering details into a computer. Either the back-office has an Enterprise Resource Planning (ERP) system such as SAP, Oracle, Microsoft Dynamics etc, or planning is done with spreadsheets and word documents.

However demand is captured, mobile apps should automatically present customer orders to a technician (on their mobile device) as a job to be processed.

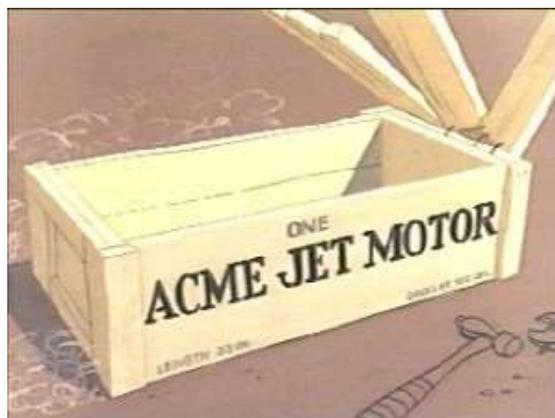
Using paperwork, this process typically involves printing orders from the back-office system and faxing or e-mailing them to a depot printer for manual collection.

Paperwork generates a host of problems when processing equipment in the depot:

- It is time consuming for the technician to record serial and part numbers (typically a 10 digit alpha-numeric code) and for the back-office team to receive and accurately rerecord the equipment information in their system.
- Some items are recorded incorrectly due to poor handwriting. Illegible serial and part numbers lead to transcription errors. Paper is easily damaged by rain and rough handling and it is not uncommon for it to just get lost.
- Missing items are not identified because depot technicians have limited time to reconcile returned equipment against the original customer contract.

- The cost of damaged items may not be recoverable from the customer if the depot technician cannot quickly and accurately record the equipment identifier, attach a digital photograph of the damage and notify the Customer Account Manager.

In order to demonstrate the benefits of replacing paper with mobile apps, we will use the ACME Corporation (famous equipment vendor from the Road Runner cartoons) as a fictitious example.



Imagine ACME is an equipment management company that builds, rents and maintains a wide range of jet motors for industrial uses.

The table below shows a snapshot of ACME equipment operations:

Measurement	Value
Technician Hourly Rate (based on Gross salary plus employer National Insurance)	£ 16.58
Administrator Hourly Rate (based on Gross salary plus employer National Insurance)	£ 10.09
Equipment Lines Delivered (per week)	2,250
Equipment Lines Returned (per week)	2,250

Figure 1: ACME Depot Profile<sup>1</sup>

Based on the figures above, the following benefits can be delivered with a paperless depot.

## Less Errors and More Productive Employees

Imagine your depot technicians could simply scan barcodes or ‘ping’ Radio Frequency Identification (RFID) tags to quickly record goods in and goods out, with zero errors.

And what if the equipment recorded could automatically update the back-office systems, with no re-keying or double handling by the admin team?

Using our real-world experience of depot logistics (with academic research papers to back it up), we have established the following benchmarks:

<sup>1</sup> Technician hourly rate based on annual salary of £29,000 for materials controller ([www.totaljobs.com](http://www.totaljobs.com)) plus £2,980 Employer national insurance to equal £31,980. Equates to an hourly rate of £16.58.

Administrator hourly rate based on annual salary of £17,898 for data entry processor ([www.reed.co.uk](http://www.reed.co.uk)) plus £1,559 Employer national insurance to equal £19,457. Equates to an hourly rate of £10.09.

- The average time for a technician to write equipment serial and part numbers to satisfy a 3 line work order is 90 seconds.
- The average time for an administrator to process a 3 line work order into the back-office system is 4 minutes.
- The probability of an error per piece of paper is 10%.
- Errors are introduced when technicians record the wrong serial number or the admin team make a mistake transcribing paperwork into the back-office system.
- On average, an error will take 7 minutes 30 seconds of technician time and 15 minutes of administration time to resolve.

When using mobile apps running on an industrial handheld or Smartphone, we have calculated that:

- The average time to process a 3 line works order is 30 seconds.
- There is no transcription work for the administrator, as serial and part numbers recorded in a mobile app are updated in the back-office system automatically.
- Barcodes and RFID remove the possibility of recording the wrong serial number. However, no matter the system, there is still a very small possibility of human error (e.g. scanning the wrong item of equipment entirely!).

Based on the assumptions above and the profile of the ACME depot operation summarised in Figure 1, the cost savings for ACME to replace paperwork with mobile apps are:

- A 67% reduction in time spent by technicians recording equipment serial numbers. On paper this takes 81 hours per month. Using mobile apps this task takes 27 hours, therefore saving 54 hours every month.
- Elimination of 217 hours data entry effort (every month) for administrators to re-key logistics paperwork. The mobile app updates all necessary back-office systems automatically, so there is no further human intervention.
- Elimination of data entry errors. Using paper, this takes 81 hours per month of technician time and 163 hours per month of admin time.

The table below is a comparison of the Paper vs mobile app costs and an estimate of the weekly and annual savings for the ACME organisation of adopting mobile apps for depot logistics.

Task	Cost of Paper Processing (Per Month)	Cost of App Processing (Per Month)	App Savings (per year)
Technician Data Recording	£ 2,694	£ 898	£ 21,554
Administration Data Entry	£ 4,372	£ -	£ 52,468
Technician Error correction	£ 1,347	£ -	£ 16,166
Admin Error correction	£ 1,640	£ -	£ 19,676
		<b>Saving</b>	<b>£ 109,863</b>

## Reduce Equipment Losses and Capture Damage Immediately

What if the status and last known location of all your equipment was available via an easy to use web or Smartphone application?

And what if equipment damage could be easily recorded and e-mailed to the customer (with a digital photograph) the moment an issue was spotted?

In our experience the following figures are indicative of a typical equipment management operation:

- Around 4 in every 1,000 items of equipment are lost in the supply chain every year.
- Only 30% of damaged equipment is being correctly reported and reclaimed.

Mobile apps have two major advantages over paperwork when equipment is returned to a depot (or inspected in the field):

- They can easily match returned equipment against the original customer order.
- They should have a process for recording damage, capturing a digital photograph and preparing an auto-generated e-mail to forward to the customer or transport company.

Matching returned equipment against the original customer order is almost impossible using paperwork, especially as your business (and order volumes) grow.

Claiming 3<sup>rd</sup> party damage is difficult if it is not quickly and accurately reported, preferably with photographic evidence.



Figure 2: An example Mobile Return App (with damage picture)

When using mobile apps for managing received or returned goods and for capturing damage in the depot or the field we have calculated that:

- Each year, equipment losses are reduced from 4 in every 1,000 to 2 in every 1,000. Assuming the average price of an ACME jet motor is £500, and that ACME handles 9,750 equipment returns per month, then the average annual saving of replacing paper with mobile apps for a company with ACME’s profile is £117,000.
- On average, 0.5% of jet motors returned to ACME from equipment rentals per year have some damage.

The average cost of repairing the damage is £125 per motor, therefore the total annual cost of repairs is £36,563.

Using mobile apps, the percentage of damaged equipment incidents captured accurately and reported on time should

increase from 30% to 50%, this generates an annual saving of £14,625 through better reporting.

The table below is a comparison of the Paper vs Mobile App costs and estimate of the annual savings for the ACME organisation.

Task	Cost of Paper Processing (Per Year)	Cost of App Processing (Per Year)	App Savings (Per Year)
Lost equipment	£ 234,000	£ 117,000	£ 117,000
Unclaimed equipment damage	£ 51,188	£ 36,563	£ 14,625
		<b>Saving</b>	<b>£ 131,625</b>

## In the Warehouse

Modern 'Lean' operations rely on the timely and accurate receipt of supplier goods. Any delay in receiving and accurately storing goods will impact productivity and customer delivery times.

Paper-based goods receipt and warehousing processes can cripple a fast moving operation. Paper matching and warehouse recording often results in a large backlog of unprocessed goods lying idle in the receiving bay.

Paper generates a range of problems when receipting and stock counting goods:

- Warehouse staff must walk from the goods receiving bay and back to the closest workstation with the supplier paperwork.

Once they find and print the originating purchase order, they return to the equipment loading bay to count the items. Finally, the back-office system will advise on the correct stock location in the warehouse where the goods should be put-away. This back-and-forth process costs time and shoe leather.

- Items may be put-away in the wrong locations. This is a serious issue when equipment is required just-in-time. Errors in equipment quantity or warehouse location can slow down, or even stop, a lean operation.

To better understand the impact of these issues, let us return to ACME organisation.

The table below shows a snapshot of the ACME warehouse operation.

Measurement	Value
Warehouse Staff Hourly Rate (based on Gross salary plus	£ 11.90
Supplier Deliveries Received (per	400
Goods Receipt & Put Away Time (Seconds per delivery)	480
% of Deliveries with Errors	20%

Figure 3: ACME Warehouse Profile<sup>2</sup>

Based on the figures above, the following benefits can be delivered with a paperless warehouse.

## Fast and Accurate Goods Receipt

What if the warehouse team could receive goods by scanning the supplier paperwork to download the relevant purchase order and continue to scan received equipment and parts to check them in?

And what if, once all delivered goods had been receipted, a Bluetooth enabled 'belt-mounted' printer automatically produced the put-away label with the correct internal references and stock locations?

<sup>2</sup> Warehouse hourly rate based on annual salary of £21,000 ([www.totaljobs.com](http://www.totaljobs.com)) plus £1,956 Employer national insurance to equal £22,956. This equates to an hourly rate of £11.90



Using our experience of implementing mobile Goods Receipt apps, we have established the following:

- The time for warehouse staff to Goods Receipt and put-away a 5 line delivery using paper is 8 minutes. This includes walking to and from ERP terminals, printing Goods Receipt Notes and manual data entry time.
- 1 in every 5 deliveries received contains an error that (if noticed) requires manual rework by back-office and warehouse staff.
- Each error takes 8 minutes to resolve.

When using mobile apps we have calculated that:

- The Goods Receipt and Put-Away process is reduced from 8 minutes to just 80 seconds.
- The error rate (when using barcodes on paperwork and equipment) is reduced from 1 in 5 to almost zero.

Based on the benchmarks above, and the profile of the ACME warehouse operation in Figure 3, the benefits for ACME in replacing paperwork with mobile apps are:

- An 83% reduction in time spent by warehouse staff receipting goods. On paper this takes 231 hours per month. Using mobile apps this task takes 39 hours per month, a saving of 193 hours per month.
- The removal of data errors in the Goods Receipt process results in 46 less hours spent on rework per month.

The table below is a comparison of the Paper vs Mobile App costs and estimate of the annual savings for the ACME organisation.

Task	Cost of Paper Processing (Per Month)	Cost of App Processing (Per Month)	App Savings (per year)
Warehouse Data Entry	£ 2,750	£ 458	£ 27,502
Goods Receipt Error Correction	£ 550	£ -	£ 6,601
		<b>Saving</b>	<b>£ 34,103</b>

## In the Field

A key part of ACME's revenue stream is the rental of jet motors to end customers and the field inspection and service of each motor once installed at the customer site.

It is therefore vital that ACME jet motors are available for delivery at the agreed customer deadline and that spare parts are well stocked in the field technician's van.

Paperwork generates the following problems when planning and executing field based operations:

- Lost rental revenue due to poor visibility of equipment location and status, leading to reduced utilisation. Equipment that could have been delivered to the customer is 'stuck' in the workshop or warehouse because it is in the wrong status in the ERP system.
- Wasted field technician time when delivery or service calls have to be repeated due to unavailable or missing stock or spare parts.
- Wasted time receiving, dropping off and filling in paperwork (especially equipment serial numbers installed and spare parts used).
- Additional transport costs (e.g. fuel, wear and tear) to support repeat customer visits.

To demonstrate the business impact of replacing field based paperwork with mobile apps, let us return to the ACME organisation and profile their field-based operation:

Measurement	Value
Field Service Technician Hourly Rate	£ 18.62
Equipment Lines Delivered	3000
% of Field Visits with Missing	10%
Average Equipment Rental (pound per day)	£2.50
Vehicle cost per mile	£0.40
Average delay to re-deliver equipment (days)	3
Technician time per delivery (mins)	75
Average distance per delivery (miles)	25

Figure 4: ACME Field Service Profile<sup>3</sup>

## Increased Equipment Utilisation and Rental Revenue

What if field technicians almost always had the correct equipment and spare parts available at the beginning of the day to satisfy their workload?

And what if your service and logistics planners could view equipment stock across all depots and vans, allocate work remotely and check on the progress of field work in real-time?

Using our experience of working with customers with a large technician field force, we have found that:

- The probability that an equipment delivery or field service call cannot be completed first time can be as high as 10%.

<sup>3</sup> Field Service Technician hourly rate based on annual salary of £32,500 ([www.totaljobs.com](http://www.totaljobs.com)) plus £3,428 Employer national insurance to equal £35,928. This equates to an hourly rate of £18.62.

This is due to a lack of available equipment and spare parts in either the supplying depot or the field service technician vans, or incorrect records of the installed equipment at customer sites.

- The average delay to re-stock the necessary equipment in the van (and therefore complete the original task) is 3 days.

When using the mobile apps, running on a Smartphone or Industrial Handheld, we have calculated that:

- The probability that equipment is not available to support the field staff drops from 10% to 5%. This is because mobile apps significantly improve equipment visibility across the supply chain, allowing logistics planners to better manage equipment stocking across multiple depots and field service vans.
- The delay in moving equipment and spare parts to the correct depot or van to satisfy demand is typically reduced from 3 days to 1 day (due to increased visibility of equipment resulting in faster re-provisioning).

Based on the assumptions above, and the profile of the ACME field operation summarised in Figure 4, the cost savings for ACME to replace paperwork with mobile apps are:

- A 92% reduction in lost rental revenue due to unavailable equipment or spare parts. When using paper, 10% of delivery and service orders require more than one visit. Each missed delivery results in 3 days lost rental revenue (at an average of £2.50 per day per item of equipment).

Given that 13,000 items of equipment are due to be delivered every month, this results in £9,750 lost rental revenue per month. Using a mobile app reduces the percentage of orders requiring more than one delivery to approximately 5%, and the average time to re-stock to 1 day. This reduces the lost rental revenue to £1,625 per month, a saving of £8,125.

- Increasing the number of deliveries and service visits that are satisfied first time delivers a significant improvement in field technician productivity. Using paper, approximately 1,300 monthly deliveries required a second visit.

Using mobile apps, this drops to 650 per month. Given that each visit takes 75 minutes on average, the time saving across the field service technician workforce is 813 hours per month.

- Mobile apps reduce the wasted journeys to and from customer sites by at least 50%. This equates to a monthly saving of £6,500.

The table below shows a comparison of the Paper vs Mobile App costs and an estimate of the weekly and annual savings for the ACME organisation:

Task	Cost of Paper Processing (Per Month)	Cost of App Processing (Per Month)	App Savings (per year)
Lost Rental Revenue	£ 9,750	£ 1,625	£ 97,500
Wasted Technician Time	£ 30,258	£15,129	£ 181,545
Additional Van Mileage	£ 13,000	£ 6,500	£ 78,000
		<b>Saving</b>	<b>£ 357,045</b>

# The Intangibles

There are many benefits of replacing paper with mobile apps, and some are difficult (or impossible) to quantify in a spreadsheet.

However, they are very important and can often be the primary business driver for investing in paperless operations.

This section outlines the five most common intangible benefits for introducing mobile apps.

## 1. Grow faster with consistent, repeatable and scalable working practices

Paper processes are difficult to control and modify with any consistency. Separate depots, warehouses and teams in the same organisation often implement subtly different paperwork and process for (what should be) identical working practices. This makes it challenging for businesses to control costs.

Defining best working practice, in an easy to use mobile app, enforces a standard approach across all parts of the operation. Users cannot mutate a mobile app to their own ends (unlike pen, paper or spreadsheets).

For industries with an ageing workforce and significant skills gaps, it is increasingly important to capture and enforce best practice consistently.

## 2. Electronic auditability: The 'Black Box' for your Operations

The ability to monitor and demonstrate process compliance is vital for customers and regulators.

Unfortunately, information stored on paper in filing cabinets is notoriously difficult to search and organise.

In the modern era of web search, e-books and app stores the next generation of industrial workers will find manila folders and index cards a completely alien concept.



Mobile apps will store the Who, What, Where, When and Why of every significant operational transaction, much like an aeroplane black box recorder.

The information in the black box can be digitally archived and searched to graphically display any operational information. For example, damaged equipment return rates by customer or geography. Figure 5 shows a sample screenshot of an Operational Analytics web app.



**Figure 5: Operations Analytics Example - Opening Up The Black Box**

### **3. Safer Working and stronger compliance to Health and Safety regulations**

Protecting the health and safety of workers and the general environment is a key objective in equipment operations. Replacing paper with mobile apps supports this objective in a number of ways.

Mobile apps capture and enforce best practice. For example, the equipment inspection checklist for the ACME Jet Engine would be an electronic representation of the experience of senior technicians combined with best practice from recognised international standards (e.g. Criticality Analysis from the PAS 55 guidelines<sup>4</sup>).

Mobile apps can warn users if equipment is out of certification, either before or during projected use. By knowing who is doing what, Apps can also determine if operators have the necessary qualifications to use the equipment for the designated tasks.

### **4. Informed and happy customers: Deliver on time and measure results**

Removing the delays and errors associated with paper processing of customer orders

delivers an immediate improvement in customer service.

Customer contact teams and operations staff will have much more confidence in stock information, leading to firm commitments on delivery times.

We have also recently added customer satisfaction surveys in our customer facing mobile apps to record direct customer feedback at the moment of customer sign-off.

And because you are capturing the workflow from order capture to customer sign-off, and storing results in the electronic black box, you can analyse and report against expected customer service levels.

Finally, apps are available to allow customers to securely access information about work and equipment you are managing on their behalf.

### **5. Win More Business: Demonstrate total control of your operation**

Competition is fierce and competitors are always looking for ways to differentiate their products and services.

Replacing paper with mobile apps provides tight control of the operation (and removes unnecessary cost). Demonstrating control and reliability is a competitive advantage.

An operations 'Black Box' also provides a rich source of information to prove you understand your customer's environment. You can demonstrate a track record of delivering equipment and services in conditions similar to that of your sales prospects.

<sup>4</sup> <http://www.bsigroup.co.uk/en-GB/PAS-55-Asset-Management/>

## Conclusion

This white paper provides a guide on how to build a business case to become a paperless operation. We have used the fictitious ACME Corporation (a medium sized enterprise in the Jet Motors business), and real world benchmarks combined with our experience, to demonstrate the potential benefits.

The savings for our fictitious ACME Corporation are substantial – over £630,000 per annum.

Department	Annual Saving
<b>In the Depot</b>	
Technician Data Recording	£ 21,554
Administration Data Entry	£ 52,468
Technician Error Correction	£ 16,166
Admin Error Correction	£ 19,676
Lost equipment	£ 117,000
Unclaimed equipment damage	£ 14,625
<b>Sub-Total</b>	<b>£ 241,488</b>
<b>In the Warehouse</b>	
Warehouse Data Entry	£ 27,502
Goods Receipt Error Correction	£ 6,601
<b>Sub-Total</b>	<b>£ 34,103</b>
<b>In the Field</b>	
Lost Rental Revenue	£ 97,500
Wasted Technician Time	£ 181,545
Additional Van Mileage	£ 78,000
<b>Sub-Total</b>	<b>£ 357,045</b>
<b>Total Annual Saving</b>	<b>£ 632,636</b>

The top three measurable business benefits of replacing Paperwork with Mobile Apps are:

1. More efficient (and better motivated) staff who can now spend more time managing customers, work and equipment and less time completing and chasing paperwork.
2. Higher equipment utilisation and increased revenue through removing the delay and error in paper-based processes.

3. Better equipped field service technicians that can deliver orders to customers first time and have all parts in stock to complete necessary service work.

Mobile apps encourage safer working, enforce best practice and increase the probability of winning repeat and new business.

We have focused on the tangible and intangible benefits of replacing paper for our fictitious ACME organisation. There are initial costs (and organisational changes) whenever you replace old technology that must be factored into a business case. However, as we hope this white paper demonstrates, you can deliver a significant return on investment when you abandon paper.

To find out more, or to discuss a tailored business case for your organisation, contact Spartan on +44 (0) 845 450 6902 or visit our website at [www.spartan-solutions.com](http://www.spartan-solutions.com).

## About Spartan

Spartan Solutions Ltd is a supplier of Mobile Apps to international companies in the oil and gas, utilities and industrial equipment sectors. Our mission is to remove the error, delay and cost of paper-based processes.

The Spartan Phalanx solution is a mobile app store for the management of work and physical assets in industrial environments. Phalanx is streamlining the operations of companies such as Aggreko, Aker Solutions, Balfour Beatty, Swire Oilfield Services and EnerMech.