

# Real-world use-case for Mobile on z

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## Agenda

- Retail business background
- Warehouse stock control
- The mobile use-case
  - Prototype and Proof of Concept
- Exploiting mobile capability: now & future
- The mobile business case:  
Lean Process Optimisation
  - Indicative savings of \$2.32M per year
- Looking ahead...



# Retail Business Background

**Top 5**  
Largest WW Retailer

**>\$100Bn**  
2013 Revenue

**6,000+**  
Stores across the world

**75 million**  
Shopping trips/ week

**500,000+**  
Global employees

Nearly  
**100**  
years old



# The Chief Technology Officer Challenge

- 5 year infrastructure strategy and roadmap session with the Chief Technology Officer



- Ability of core mainframe systems to deliver **DevOps**, **Cloud**, **Mobile** solutions **Securely**

**“You can do mobile on a mainframe? Really?”**

**“Show me”**



# Warehouse Stock Control



## Warehouse Stock Control

- A key area of differentiation for Retail is in the Supply Chain
  - Using **advanced technology**, they support a **modern, efficient & cost-effective** supply chain
- Operating over **25** Distribution Centres in one country
  - Totaling over **11.5 million** sq. ft.
  - Operating **365** days/yr; **24** hours a day **7** days a week
- Underpinning its fulfillment process is their Warehouse Management System (WMS)
  - A **CICS** application delivered on a **z Enterprise**
  - Provides **logistics, stock process** and **flow** in all DCs across the country
  - That's over **40 million** cases. Every week!



## Warehouse Stock Control: Use-cases for Mobile

- The WMS provides a rich set of functions for warehouse staff
  - Today the WMS is **accessed** via a **console**, as an **extensive menu** sub-system
  - For this piece of work, focus was given to **2 key functions / use-cases** provided by the WMS
  - Use-cases that would be **valuable** to access via a **mobile** device

### 1) Order Fulfillment Progress

- Stock must be **picked**, **packed** and made **ready** for distribution by **end-of-day** truck collection
- Managers use this information to **optimally allocate** staff
- As a result, the manager must cross the floor (**500,000 sq ft**) **throughout the day** to ensure appropriate progress

### 2) Internet Direct 'Orders Held'

- Specific **high-value** orders from the internet can be held, potentially for **premium** customer service or delivery
- Warehouse managers review these orders and allocate the **most appropriate** delivery service



# WMS Access: Today

- The WMS provides a rich set of functions for warehouse staff
  - Accessed via a 3270 console, as an extensive menu sub-system

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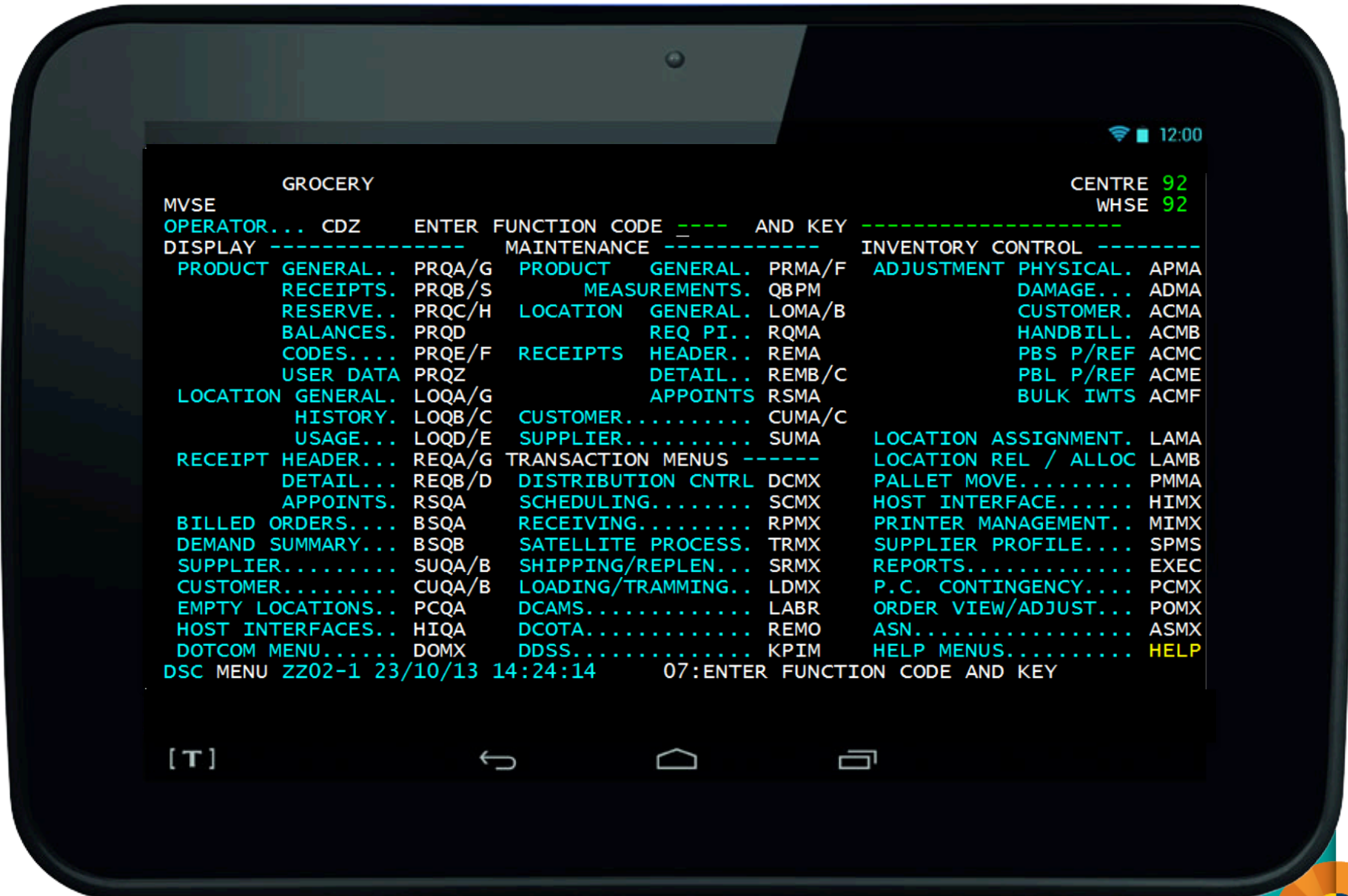
GROCERY
MVSE
OPERATOR... CDZ      ENTER FUNCTION CODE _ AND KEY
DISPLAY ----- MAINTENANCE ----- INVENTORY CONTROL -----
PRODUCT GENERAL.. PRQA/G  PRODUCT GENERAL. PRMA/F  ADJUSTMENT PHYSICAL. APMA
RECEIPTS. PRQB/S      MEASUREMENTS. QBPM      DAMAGE... ADMA
RESERVE.. PRQC/H      LOCATION GENERAL. LOMA/B  CUSTOMER. ACMA
BALANCES. PRQD        REQ PI.. RQMA            HANDBILL. ACMB
CODES... PRQE/F      RECEIPTS HEADER.. REMA    PBS P/REF  ACMC
USER DATA PRQZ      DETAIL.. REMB/C          PBL P/REF  ACME
LOCATION GENERAL. LOQA/G  APPOINTS RSMA            BULK IWTS  ACMF
HISTORY. LOQB/C      CUSTOMER..... CUMA/C
USAGE... LOQD/E      SUPPLIER..... SUMA      LOCATION ASSIGNMENT. LAMA
RECEIPT HEADER... REQA/G  TRANSACTION MENUS ----- LOCATION REL / ALLOC  LAMB
DETAIL... REQB/D      DISTRIBUTION CNTRL DCMX  PALLET MOVE..... PMMA
APPOINTS. RSQA      SCHEDULING..... SCMX    HOST INTERFACE..... HIMX
BILLED ORDERS... BSQA  RECEIVING..... RPMX     PRINTER MANAGEMENT.. MIMX
DEMAND SUMMARY... BSQB  SATELLITE PROCESS. TRMX  SUPPLIER PROFILE.... SPMS
SUPPLIER..... SUQA/B  SHIPPING/REPLEN... SRMX  REPORTS..... EXEC
CUSTOMER..... CUQA/B  LOADING/TRAMMING.. LDMX  P.C. CONTINGENCY... PCMX
EMPTY LOCATIONS.. PCQA  DCAMS..... LABR      ORDER VIEW/ADJUST... POMX
HOST INTERFACES.. HIQA  DCOTA..... REMO      ASN..... ASMX
DOTCOM MENU..... DOMX  DDSS..... KPIM      HELP MENUS..... HELP
DSC MENU ZZ02-1 23/10/13 14:24:14 07:ENTER FUNCTION CODE AND KEY

```





# WMS Access: Challenges of mobile - Screen size



```

                                12:00
                                CENTRE 92
                                WHSE 92
MVSE
GROCERY
OPERATOR... CDZ      ENTER FUNCTION CODE _ AND KEY
DISPLAY -----
PRODUCT GENERAL.. PRQA/G  PRODUCT GENERAL. PRMA/F  ADJUSTMENT PHYSICAL. APMA
RECEIPTS. PRQB/S      MEASUREMENTS. QBPM      DAMAGE... ADMA
RESERVE.. PRQC/H      LOCATION GENERAL. LOMA/B  CUSTOMER. ACMA
BALANCES. PRQD        REQ PI.. RQMA            HANDBILL. ACMB
CODES... PRQE/F      RECEIPTS HEADER.. REMA    PBS P/REF  ACMC
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```

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# WMS Access: Challenges of mobile - Keyboard



# WMS Access: Challenges of mobile - Menu navigation



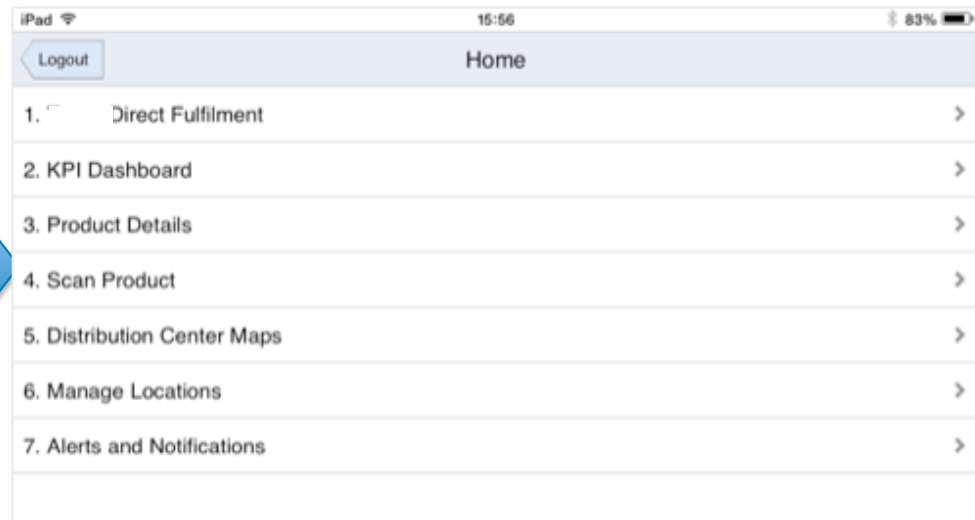
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# Prototype and Proof of Concept



# WMS Mobile Proof of Concept Overview

- In order to assess the viability of mobile-enabling the WMS, a proof of concept was undertaken by the Client and IBM teams
- The objectives of the proof of concept were to:
  - Identify a **few key functions** that would be **valuable** to be made available throughout the DC
  - Assess the **effort** required to make the necessary functions available on a mobile device
  - Identify ways to **simplify** the **user interface (UI)** with the use of mobile app technology
  - Explore the possibility of **extending WMS** functions through the use of **colour-coding**
  - Exploit the mobile UI to more **naturally render KPIs** and **charts** of information



## WMS Mobile PoC: The technical challenge

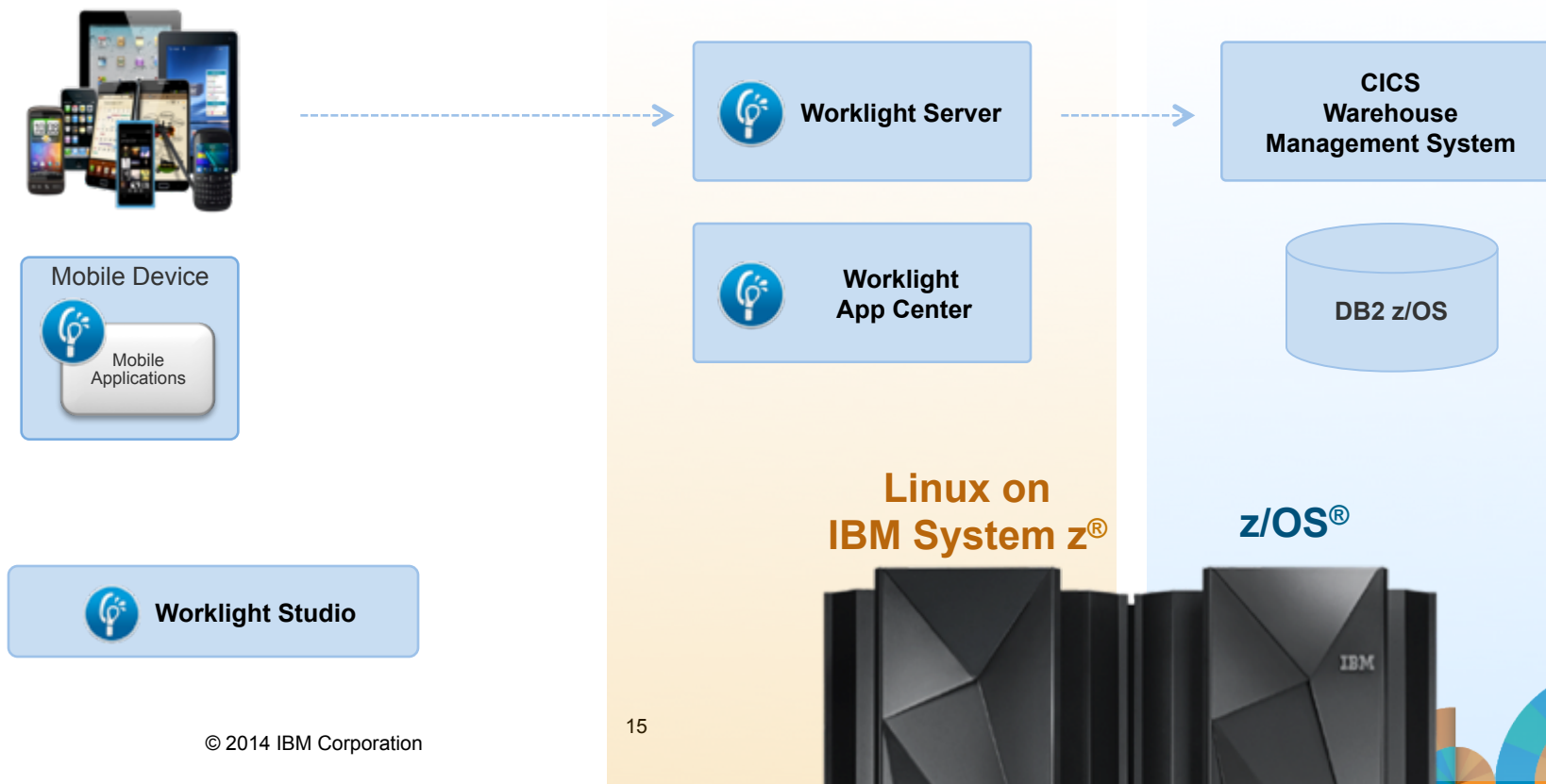
- The technical challenge was to take the **existing WMS CICS application** and make it available to **multiple mobile devices** in the form of a consumable **mobile app**
- There are many options available today for mobile-enabling a mainframe applications
  - **Messaging paradigms**, such as WebSphere MQ
  - **Web Services** [SOAP over HTTP/s]
  - Direct **mobile technologies**, such as JSON
  - **Bridging technologies**, e.g HATS, 3270 bridge
  - Direct **RESTful interfaces** (NEW! z/OS Connect)
- Specific business requirements
  - Make bare **minimum of changes** to the CICS system
  - Make absolutely **no changes** to the WMS application
  - **Exploit** the existing **Linux for System z** implementation
  - Deliver this PoC as **rapidly** as possible: **days/ weeks** not months
- The **in-built bridging technologies** were chosen call the WMS application
- **IBM Worklight** on **Linux on z** was chosen to deliver the mobile app capability



## WMS Mobile PoC: Solution Components

The key components of the solution included:

- The WMS, based on **CICS Transaction Server**
- Mobile Enterprise Application Platform, using **IBM Worklight**
- An enterprise app store using using the **IBM Worklight App Center**



# WMS Mobile PoC: App Screen-flows (1) Order Summary



18:44 43%

Home

Direct Fulfilment - Work in Progress

Currently working: 08/11/2013 TEST DATA Time left: 7 hours 36 minutes

Required case throughput: 172 cases / hour

	Orders	Cases	Percentage	Orders on hold	Orders overdue
No stock reserved	17	57	1%		17
Stock reserved	1	42	1%	<u>4</u>	1
Ready to bomb	0	0	1%		
Bombed	126	395	6%		126
Pick start	10	16	0%		10
Pick complete	103	400	6%		104
Pack start	39	90	1%		34
Pack complete	38	261	4%		43
Manifested	1582	5120	80%		1582
Unsatisfied		48	1%		
<b>TOTAL</b>	<b>1916</b>	<b>6429</b>		<u><b>4</b></u>	<b>1917</b>

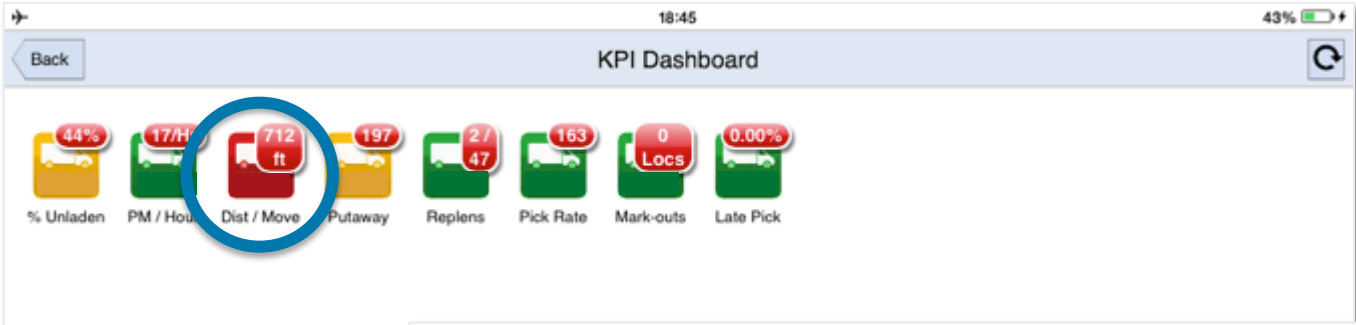




# WMS Mobile PoC: App Screen-flows (2) KPI Dashboard



# WMS Mobile PoC: App Screen-flows (3) Colour extension



Time slot	Total pallets	Driver time (mins)	Pallets per hour
00:51-01:50	203 (TEST)	585	20.8
01:51-02:50	40	144	16.7
02:51-03:50	173	565	18.4
03:51-04:50	160	569	16.9
04:51-05:50	173	576	18
05:51-06:50	111	327	20.4
06:51-07:50	115	398	17.3
07:51-08:50	123	434	17
08:51-09:50	144	473	18.3
09:51-10:50	93	306	18.2
10:51-11:50	127	396	19.2
11:51-12:50	141	447	18.9
12:51-13:50	166	518	19.2
13:51-14:50	160	447	21.5
14:51-15:50	243	628	23.2
15:51-16:50	170	619	16.5




# WMS Mobile PoC: Current and future Worklight exploitation

 **100%** code re-use 

 Industry Standard development & coding 

Dedicated Private



Corp App Store

Current Exploitation





Native adapters





packaged integration


Future Exploitation

 **GPS**  
Location aware

 **Push notifications**

 **Barcode scanning**

 **Triple-security**

 **Offline data**



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# The mobile business case Lean Process Optimisation



## Mobile-enabling WMS: Lean Process Assessment (1)

- In order to determine the business impact and potential benefit of mobile-enabling WMS, the IBM team undertook a Lean use-case assessment in parallel to the technical engagement
- Supply Chain Management is a key part of the Retail business model
  - Distribution processes, systems and network of DCs are designed to **maximise efficiency**
  - Labour scheduling and transport planning systems are designed to enable pickers and drivers to operate **highly effectively**
  - Distribution networks are **optimised** to minimise mileage needed to get products to store in **perfect condition**
- Warehouse Problem Statement highlights
  - Total space of **13 million** sq. ft. of warehouse
  - Spread across **25** Distribution Centres
  - Each DC is supervised and run by **4 managers**
  - DC managers can cross the floor up to **10 occasions**
  - They may spend up to **10 mins** each time in doing so



## Mobile-enabling WMS: Lean Process Assessment (1)

- 100 managers making 10 trips of 10 mins back to their screen a day
- $100 \times 10 \times 10 = 10,000$  mins/day walking across the DC across all the managers
- $10,000$  mins/day  $\times$  5 days a week  $\times$  48 weeks a year = **2,400,000** mins/year or **40,000** hrs
- Fully burdened rate of a DC Manager = **\$105k** per annum
- Cost per hour of a managers time =  $\$105,000 / 48$  weeks /  $37\frac{1}{2}$  hours = **~\$58** per hour
- Cost of wasted walking time =  $40,000$  hours  $\times$  **\$58** = **\$2,320,000** per annum
- This works out at about **\$6,390** per day

**If Worklight costs \$100K then this business case pays for itself in ~16 days!**



## Summary: Mobile-enabling WMS CICS application

- Working closely together as a joint IBM/Client team, the PoC was a great success!
- The team were successfully able to:
  - Get **access** into the **CICS system** in a matter of **days**
  - Exploit access using **Worklight** adapters in **1 week**
  - Develop a **simple-to-use** mobile **app** in **1 week**
  - **Optimize** the **8-level** sub-menu to a **3-level** sub-menu
  - A team of **3 IBM** specialists and **2 Client** specialists
- What's next...?
  - **IBM Worklight** was acquired to mobile-enable WMS in **Dec 2013**
  - Work progresses in earnest to deliver this **in production**
  - Extend the original scope for **additional use-cases**
  - Expand the architecture for **production-ready** deployment
- And then...?
  - The retailer runs many **strategic applications** on **System z**, such as:
  - Store replenishment & Global ordering Systems
  - Global logistics management
  - **All** of which could **benefit** from **mobile access**



# THANK YOU

