Fulfilling Retail Expectations with Mobile

30 September 2014
WebSphere User Group | Royal Society of Edinburgh

Richard Gamblin
Software Architect | Mobile, WebSphere & System z

richard.gamblin@uk.ibm.com | +44(0)7894 475263 | @RichGx

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

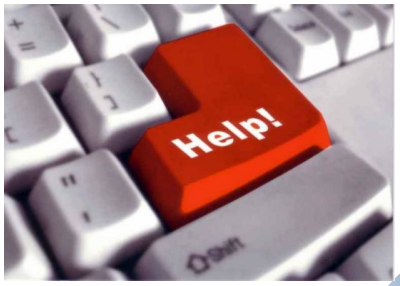
>$100Bn
2013 Revenue

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

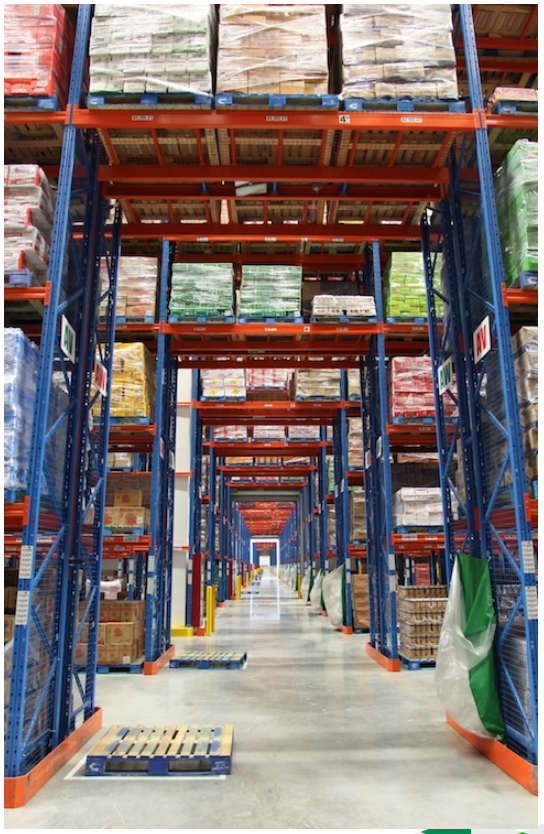
- A key area of differentiation for Retail is in the Supply Chain
  - Using advanced technology, they support a modern, efficient & cost-effective supply chain
- Operating over 25 Distribution Centres in one country
  - Totaling over 11.5 million sq. ft.
  - Operating 365 days/yr; 24 hours a day 7 days 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

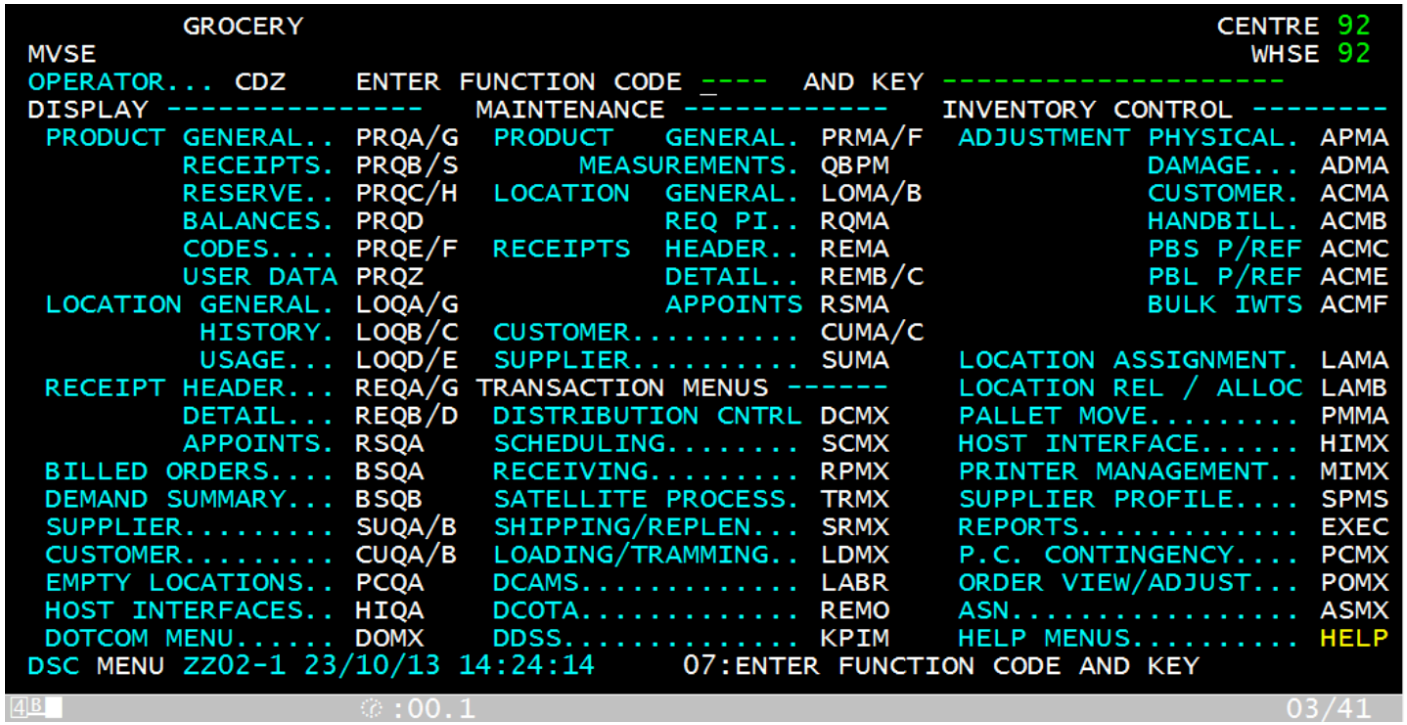
1) Order Fulfillment Progress
   - Stock must be picked, packed and made ready for distribution by end-of-day truck collection
   - Managers use this information to optimally allocate staff
   - As a result, the manager must cross the floor (500,000 sq ft) throughout the day to ensure appropriate progress

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



WMS Access: Challenges of mobile - Screen size

WMS Access: Challenges of mobile - Keyboard

WMS Access: Challenges of mobile - Menu navigation

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 WebSphere MQ
  - Web Services [SOAP over HTTP/s]
  - Direct mobile technologies, such as JSON
  - Bridging technologies, such as Link3270
  - Direct RESTful interfaces (z/OS Connect)

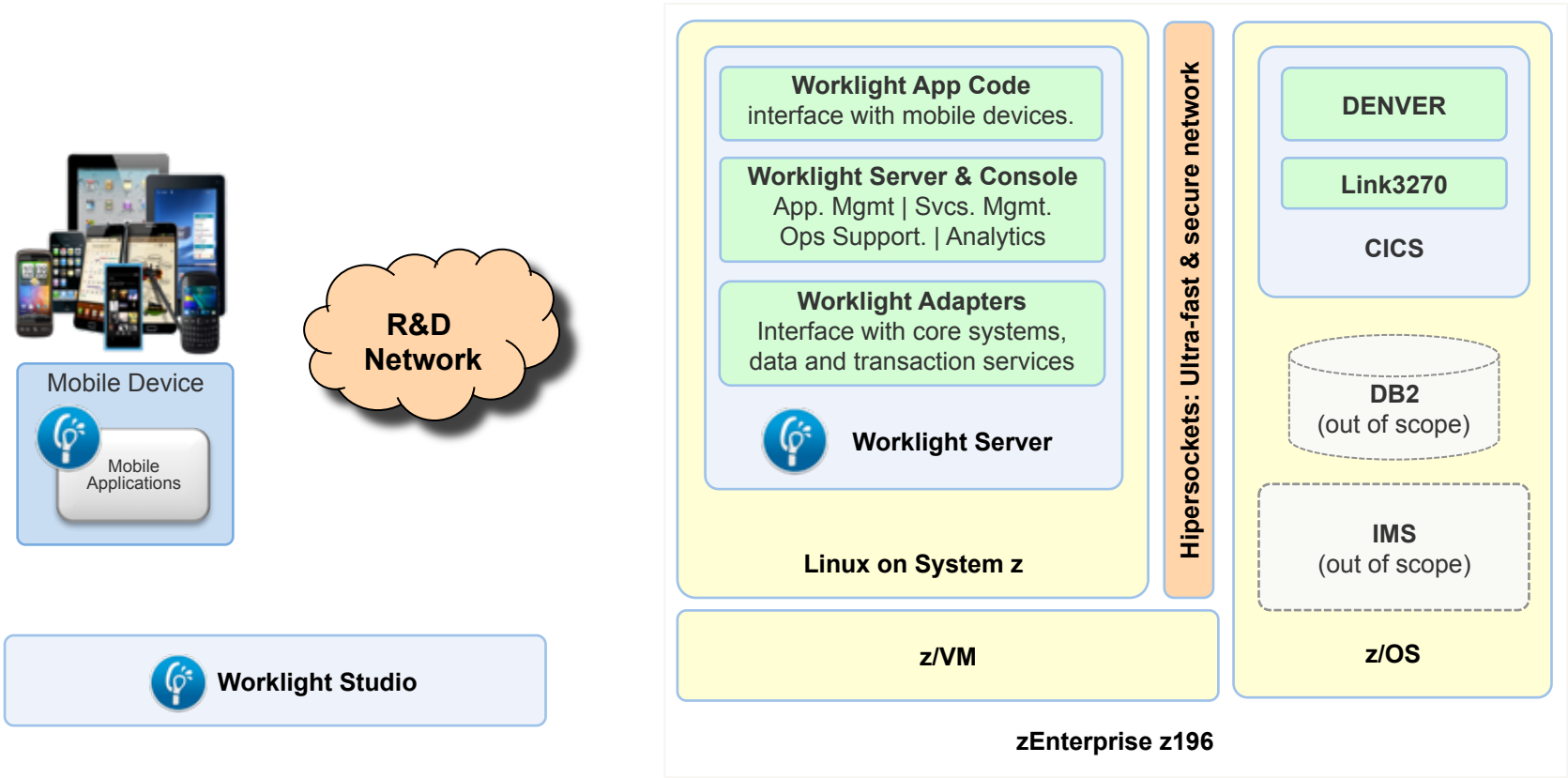
- Specific business requirements
  - Make bare minimum of changes to the CICS system
  - Make absolutely no changes to the WMS application
  - Exploit the existing Linux for System z implementation
  - Deliver this PoC as rapidly as possible: days/ weeks not months

- The in-built bridging technologies were chosen call the WMS application

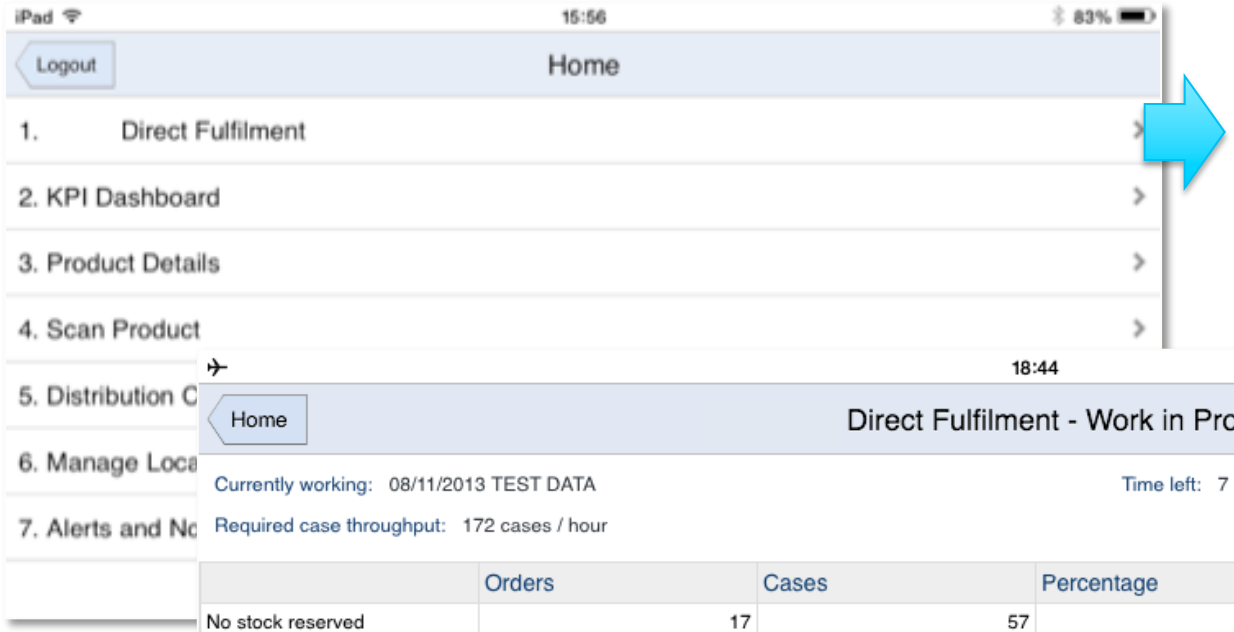
- IBM Worklight on Linux on z was chosen to deliver the mobile app capability

Denver Mobile PoC: Solution Components

- The key components of the solution included:
  - The Denver Warehouse Management System, based on CICS Transaction Server 4.2
  - A custom-designed mobile app for Android and iOS, built using Worklight Studio 6.1
  - A set of re-usable adapters for integration and packaged function using Worklight Server 6.1
  - An enterprise app store using using the 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

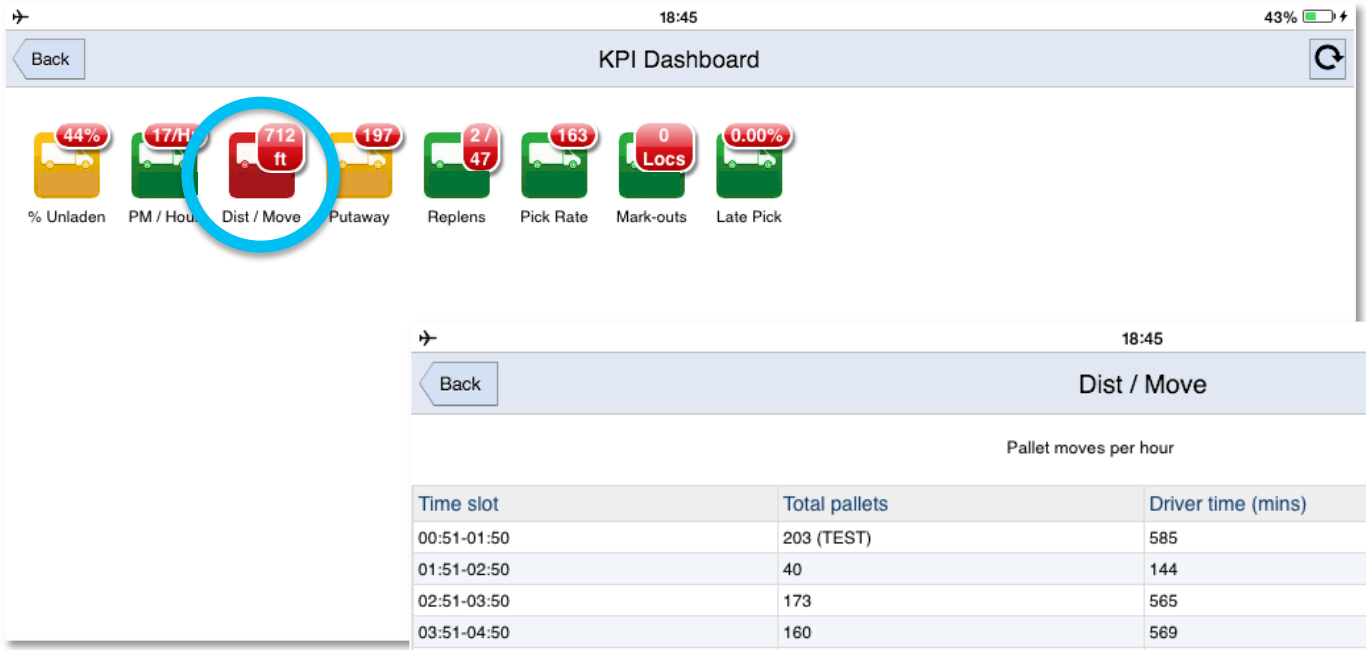
Time left: 7 hours 36 minutes

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%	4	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%		
TOTAL	1916	6429		4	1917

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

Current Exploitation

Worklight®

Dedicated Private

Corp App Store

Native adapters

packaged integration

Future Exploitation

GPS

Location aware

Push notifications

Barcode scanning

Triple-security

Offline data

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 the 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 x 10 x 10 = **10,000** mins/day walking across the DC across all the managers
- 10,000 mins/day x 5 days a week x 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 / 37½ hours = ~$58 per hour
- Cost of wasted walking time = 40,000 hours x $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