

# RFID Case Study

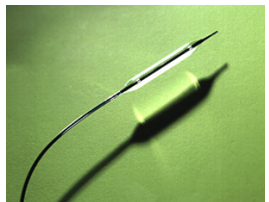
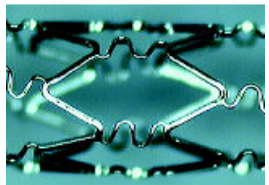
## Orthopaedics RFID Application for "Loaner Set" Logistics

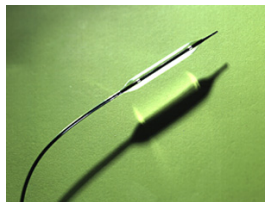
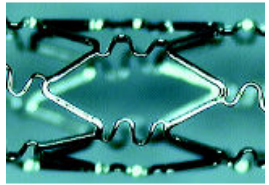
HIBCC Auto-ID Technical Committee  
19 January 2006



# The orthopaedics products supply chain

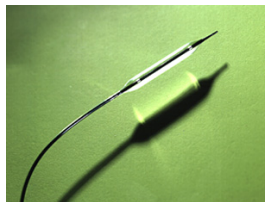
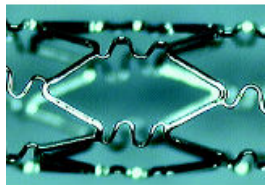
- Product types includes:
  - Implants for joint surgery – eg artificial knees and hips
  - Trauma products. Typically for car accident and similar injuries. Plates, rods, screws etc.
  - Spinal injury products
- Products are typically supplied as:
  - Consignment stock
  - Loan set arrangements





# Consignment Stock

- Products warehoused at the hospital, and owned by the supplier until they are used.
- Typically stored within operating room stores, or CSSD
- Products are invoiced by the supplier following usage of a product
- High degree of traceability required
- Replenishment is based on usage. Typically replenished following the reported usage by the hospital



# Loan Set Business Model

- **Surgeon books a loan set for a specific patient procedure with the hospital**
- **Loan set includes:**
  - Sterile implants – full set of implants including all sizes.
  - Set-up implants (templates) for sizing during surgical procedure
  - Non-Sterile implants – screws and other similar components used to “fix” the implant to the patient
  - Non- sterile surgical instruments necessary to perform the procedure
- **Surgeon performs procedure within hospital, uses the right size implants, and returns loan set including instruments and un-used implants to the supplier.**



# Current Logistics for Loan Sets - Booking

Loan set booked by surgeon



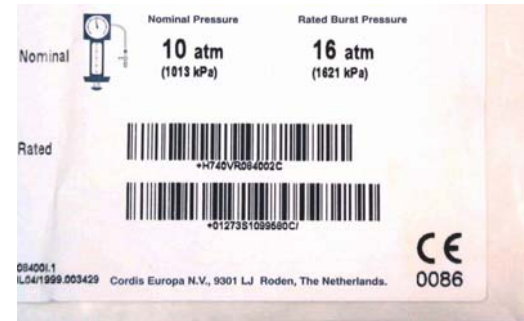
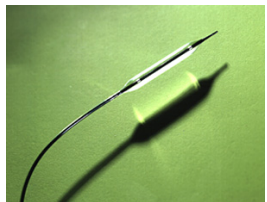
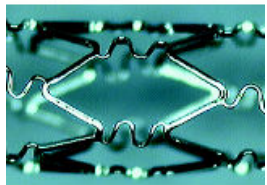
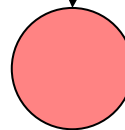
Supplier puts together loan set, scans primary and secondary barcodes on all implants



Bill of materials for loan set created



Loan Set Shipped





# Current Logistics for Loan Sets - Hospital

Hospital receives loan set  
(usually in CSSD or operating  
room stores)

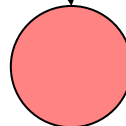
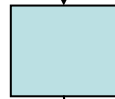
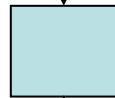
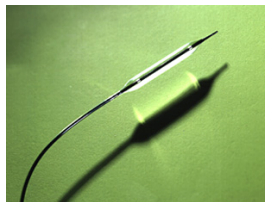
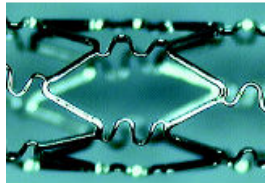
Removes non-sterile  
instruments, and puts through  
sterilization process

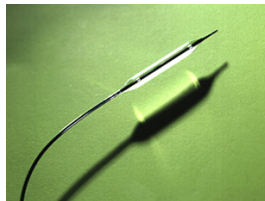
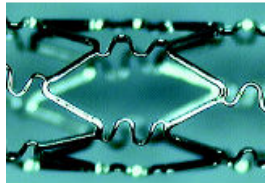
Once instruments sterilized,  
loan set including instruments  
and implants put together  
again, and delivered to  
operating room for surgery

Surgical procedure  
performed, scout nurse  
captures products used,  
including the lot numbers

Hospital returns loan set to  
supplier

Sends PO to supplier for  
implants used. Includes lot  
numbers, surgeon and MRN  
for patient





po.qfp



# ACT Health Supply Services

PO Box 47 Mitchell ACT 2911

## Purchase Order

ABN: 82 049 056 234

Department of Health and Community Care

(DUPLICATE)

**Purchase Order No: 541127**

**Account No: 1ACT2606**

Please quote this number on all deliveries and invoices.  
Please supply the undermentioned goods/services in accordance  
with the attached terms and conditions.

DELIVER TO:

The Canberra Hospital Supply Receiving Dock  
Gillmore Crescent, GARRAN, ACT

2605

To Supplier:

STRYKER AUSTRALIA P/L  
UNIT 58, 2A HERBERT STREET, ST LEONARDS, NSW 2065

Supplier Contact:

Contact Fax: 0294671110

Note to the supplier:

Line No	Order Qty	Sell Unit	Item/Service Description	Supplier Cat No.	Unit Price	GST	Total (excl GST)
1	1	EACH	EXETER FEMORAL STEM NUMBER 2 50MM	0580-1-502			
Comments: Patient: 366030 Lot: G1029760E7D04 Dr Smith Procedure Date: 23-Sep-2005 Consignment Replace							
2	1	EACH	INTERMEDULLARY PLUG 14MM	0939-0-114			
Comments: Patient: 366030 Lot: F51T2L2306 Dr Smith Procedure Date: 23-Sep-2005 Consignment Replace							
3	1	EACH	TRIDENT ACETABULAR CLUSTER SHELL 56MM	542-11-56 F			
Comments: Patient: 366030 Lot: 13686201 Dr Smith Procedure Date: 23-Sep-2005 Consignment Replace							
4	1	EACH	TRIDENT POLYETHYLENE ACETABULAR INSERT 10 DEGREE F	621-10-32			
Comments: Patient: 366030 Lot: 14511101 Dr Smith Procedure Date: 23-Sep-2005 Consignment Replace							
5	1	EACH	FEMORAL HEAD METAL -OTRTHONIX 32MM STD	6364-2-132			
Comments: Patient: 366030 Lot: G1235399F6D03 Dr Smith Procedure Date: 23-Sep-2005 Consignment Replace							
6	1	EACH	FREIGHT*				

Purchase Order No: 541127

Page: 1

Date of Order: 26/09/05

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# Current Logistics for Loan Sets – Returned Loan Sets

Supplier receives returned loan sets.

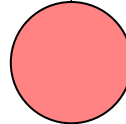
Barcode scans implants remaining in loan sets. Verifies that all instruments are returned.

Determines by deduction implants used by the hospital, puts away unused implants in warehouse to make available

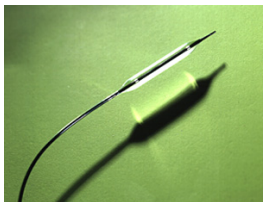
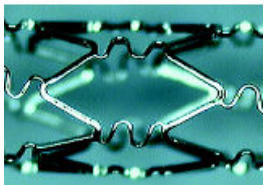
Receives PO from hospital, and reconciles against their records of consumption based on what was returned

Sends invoice to hospital. Resolves any discrepancies.

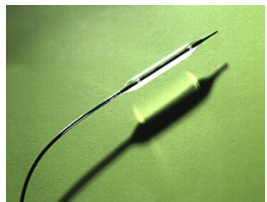
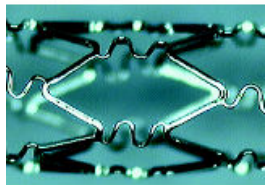
Gets paid



Time consuming. Takes typical large supplier an entire day to process returned loan sets from previous day







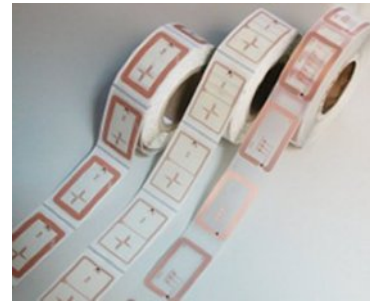
# RFID enabled process

Supplier attaches RFID tag to box of every implant. Magellan Stack Tags – 13.56MHz

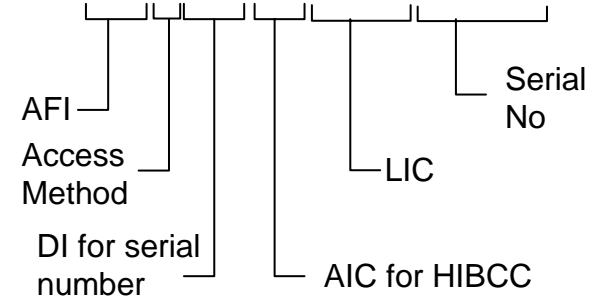


Scans primary and secondary HIBC barcodes

Creates serialized HIBC number, and codes to RFID tag. Relates this serialized number to the primary and secondary barcode in the database

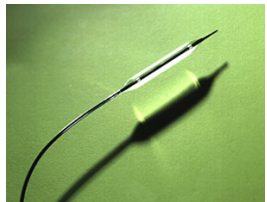
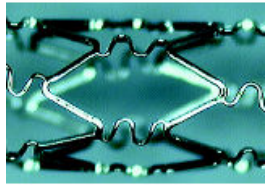


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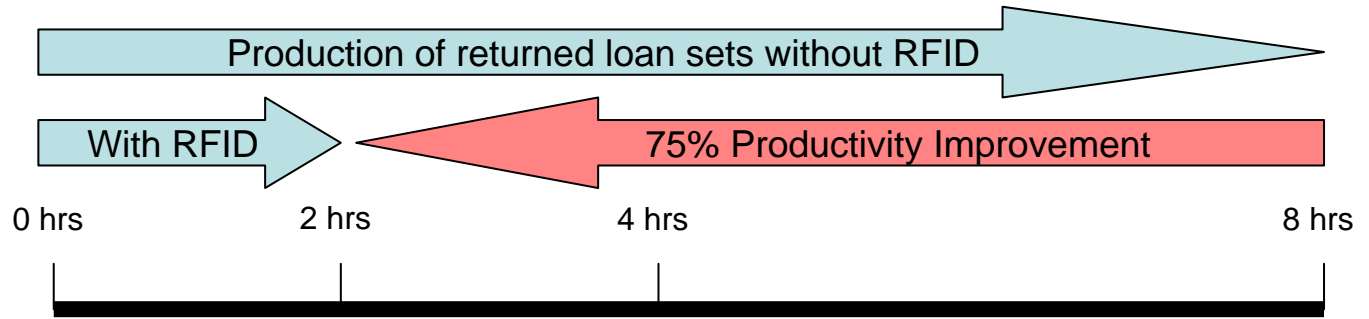


Reads all RFID tags on implants in loan set by putting through Magellan Tunnel Readers (booking out and returned loan sets)

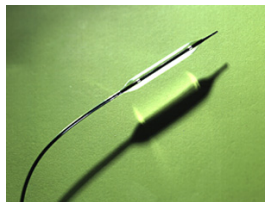
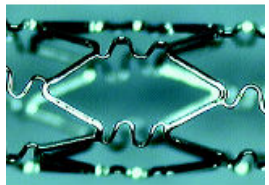




# What are the benefits?

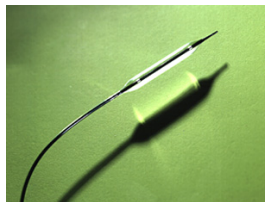
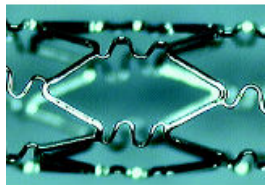


- **Significant Productivity Improvement**
- **Significant Reduction in inventory held**
- **Reduction in working capital = increased profitability**
- **Improved traceability**



# Current Challenges

- **Tracking of Non-Sterile Surgical Instruments and implants – very challenging:**
  - Metal surface
  - High temperatures of the Autoclave
  - Small surface area – requires very small tags in some instances
- **If this problem can be solved – very valuable!!**



# MEMS is a possible Solution

## RFID chip - CMOS vs MEMS

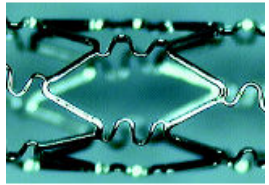
	EXISTING RFID TECHNOLOGY	Mems-ID RFID TECHNOLOGY
<b>RFID Chip</b>	Microelectronic integrated circuits (ICs)	Mems-ID chip
<b>Manufacturing approach</b>	CMOS → <b>mature technology</b>	MEMS → <b>disruptive techn-ology</b>
<b>Manufacturing requires:</b> - Processing steps - Equipment	10 – 20 masks Expensive ultra high vacuum equipment	3 – 4 masks Lower cost processing equipment
<b>Cost of RFID chip</b>	Relatively expensive > US \$0.12 - \$2.00 (high volume)	Low-cost < US \$0.01 - \$0.05 (high volume)
<b>Applications</b>	Expensive items or on pallets	Individual items and cartons



# Value proposition of MEMS



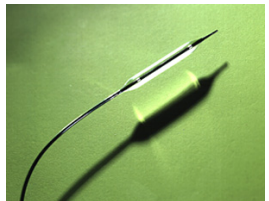
- **Integrated functionality into a single chip**
  - Sensor capability – temperature and thaw indication
  - Security features – similar to electronic article surveillance (EAS)

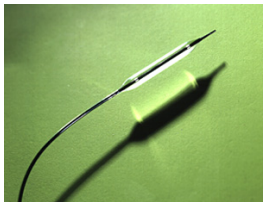
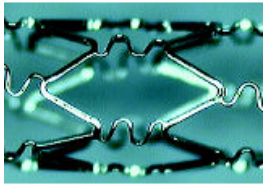


- **Ability to withstand high temperatures and irradiation**
  - easily withstand the high autoclaving temperatures and/or irradiation steps needed for modern sterilization procedures without the need for additional costly protection packaging



- **Small Chip Size**
  - directly embedded into product





# Questions?



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