IMS “Extreme Makeover” at Westpac
(from XRF to IMSPLEX)

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IBM Software
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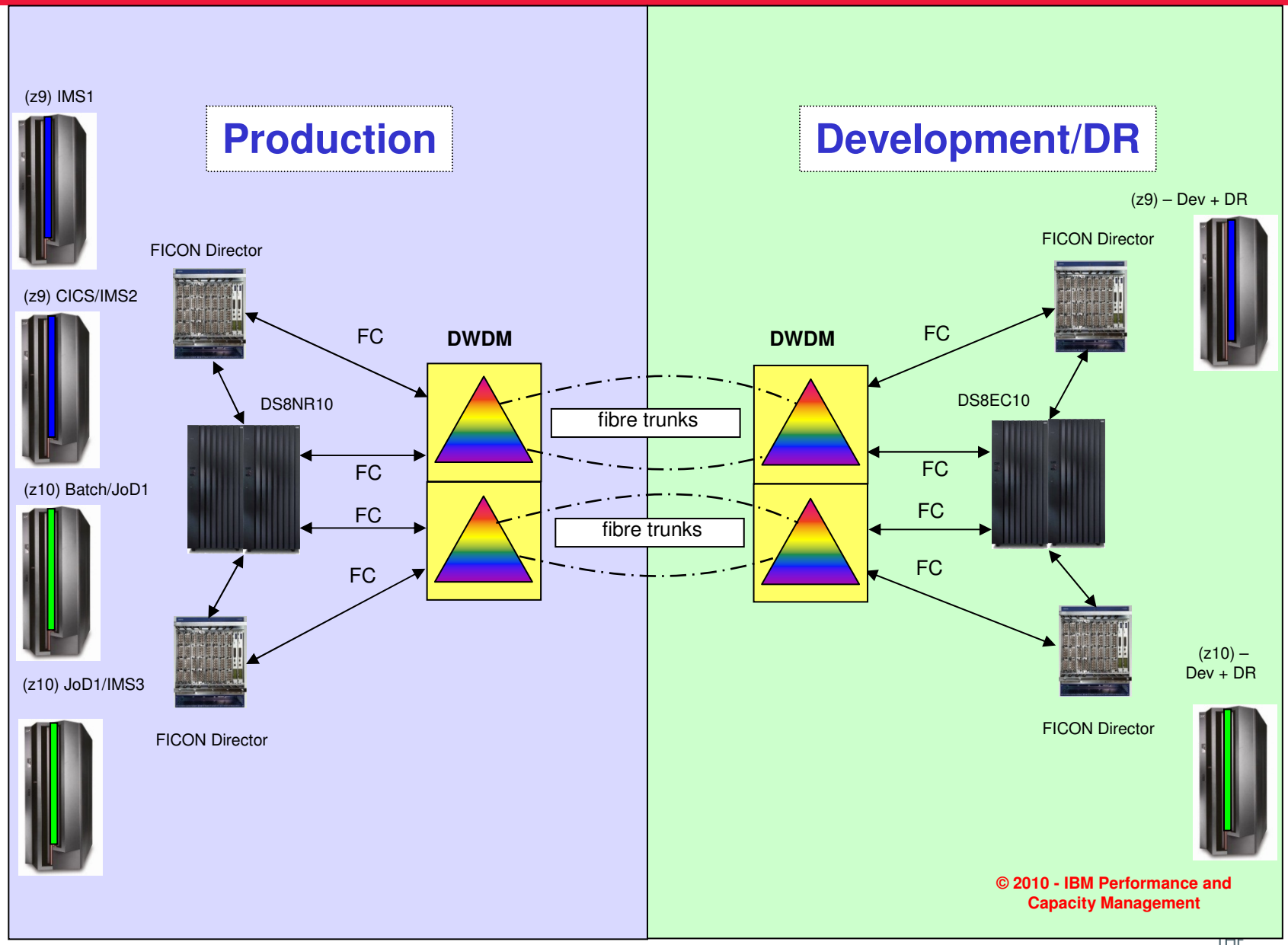
Agenda

- Westpac Environment Overview
- Before IMS Environment
- Rationale for Change
- Target IMS Environment
- Stages of Implementation
- Outstanding Issues
- Benefits
- Timeline
- Recommendations
- Questions

Westpac Environment Overview

Configuration



Before Project Commencement

Environments

- SITE 1
  - PROD
- SITE 2
  - SOCIABILITY
  - DEV
  - TEST
  - DR

Before Project Commencement … cont'd

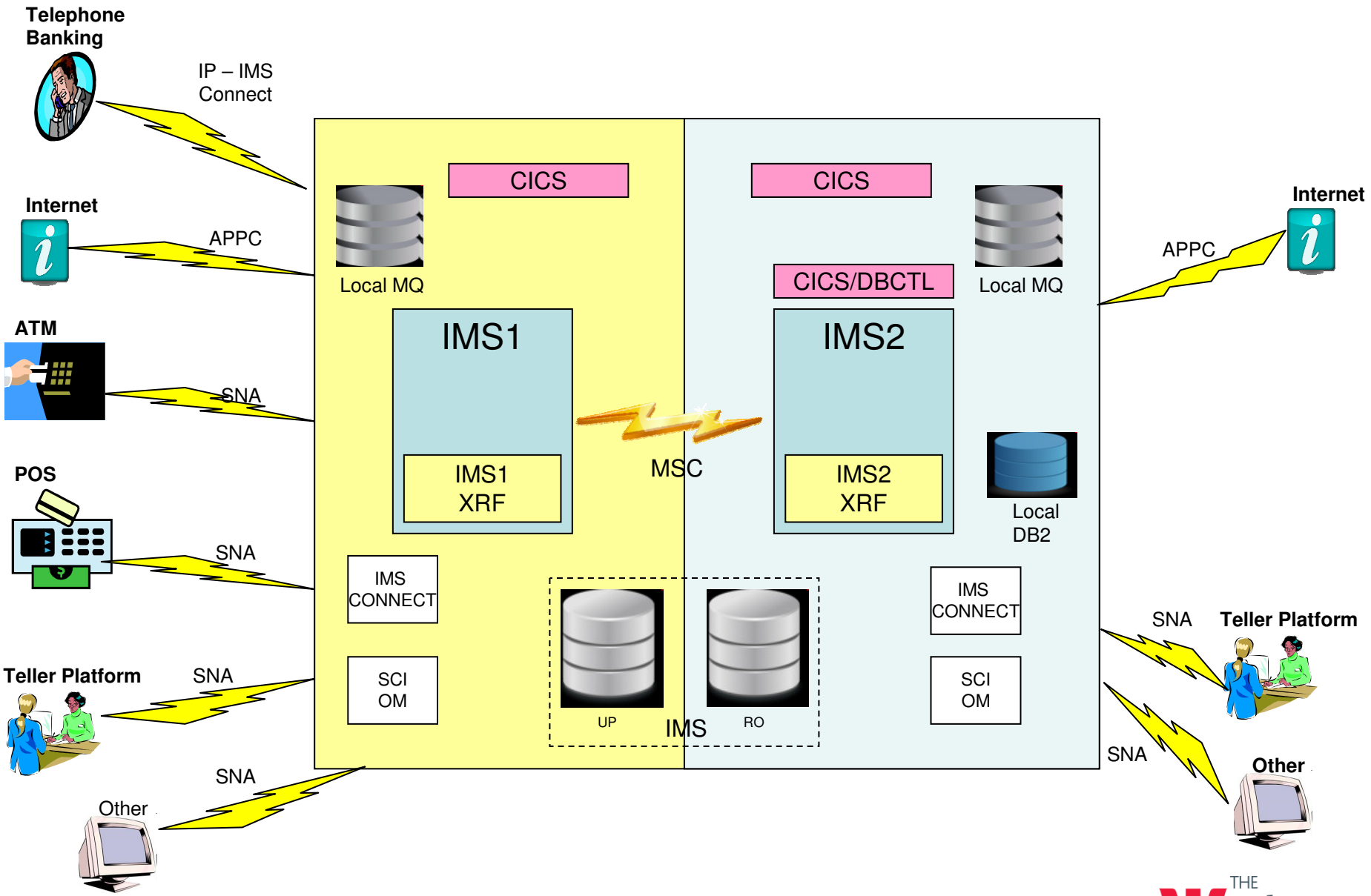
- Outsourced to IBM
- GDPS and Hyperswap
  - Mirrored production data (disk and tape) to fallback site
  - 4 hour DR recovery timeframe proven
- With multiple mainframes in place, primary strategy is local site fallback
  - Shift workloads around as required
  - For extended outage, move the LPAR

Before Project Commencement … cont'd

- Centralised security model, all data protected by default
- Online – CICS, IMS, DB2, MQ & Websphere
- Process over 70 million online business transactions through IMS, CICS and Websphere each day
- Sustained peak rates over 2000 tps
- Spike peak higher at 3000 tps and above

IMS Environment Before Commencement

IMS Environment before commencement



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IMS ONLINE

- 2 IMS online systems
- XRF used to enhance availability for scheduled change and unscheduled outage
- Connections must specify IMS1 or IMS2 (uservars)
- IMS systems connected via MSC links
- Each IMS system genned separately and treated separately

IMS ONLINE … cont'd

- Database shared at the database level
  - One updater one reader
  - No record locking available for majority of read databases
- 1 local DB2 subsystem
- 3 local MQ subsystems
- Online change used to enhance availability
- IMS batch (DLI) environment

IMS ONLINE Workload

- Transactions MPP (Message Processing Program)
  - Inbound channels
    - LU2, LU1, LU0, APPC/LU62, LU61, TCPIP, MQ/OTMA
  - Interfacing Subsystems
    - DB2, MQ, CICS, IMS Connect
  - Processing
    - Unique DB access method - DBEMINT
    - MFS (Message Format Services)
    - Message switching
- BMPs (Batch Message Processing)
  - Online Batch Program targeting specific IMS
- DBCTL
  - CICS frontend – IMS/DB backend

Rationale for Change

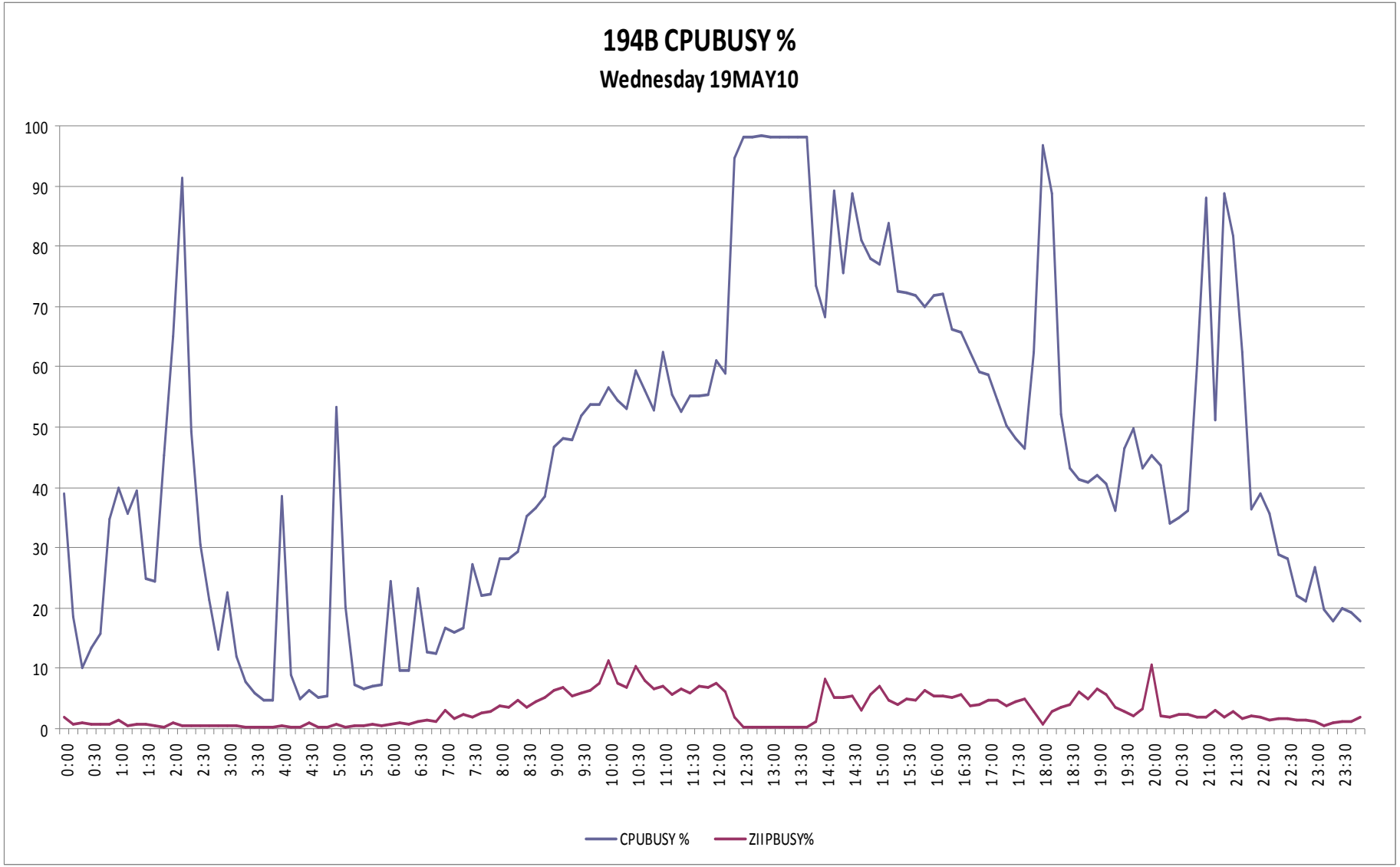
Rationale

- Mainframe Strategy – “Stay out of the NEWS”
- Key Drivers
  - Front end issue drives single LPAR utilisation to 100%
    - Other LPARs have 30-40% spare capacity
  - Up to 2 minute impact under XRF
    - Possible impact 240,000 customer trans at peak time
  - Required unused capacity for tracking XRF systems
    - Planned versus unplanned outage
  - Higher business expectations for IT availability
  - GM support willing to back the project

Rationale … cont'd

- High Availability
  - Target 24 x 7 ***including scheduled change***
- Balance workload CPU
  - 1x Retail IMS (high volume >22 mill per day)
  - 1 x Institutional IMS (high value >3 mill per day)
- Cloning – simplifies build
  - Easier to add or delete IMS system(s) if needed
  - Faster, easier application development = less time to market for business
- Reduce infrastructure SPOF for IMS & network

Capacity After Front End Problems Before IMSPLEX



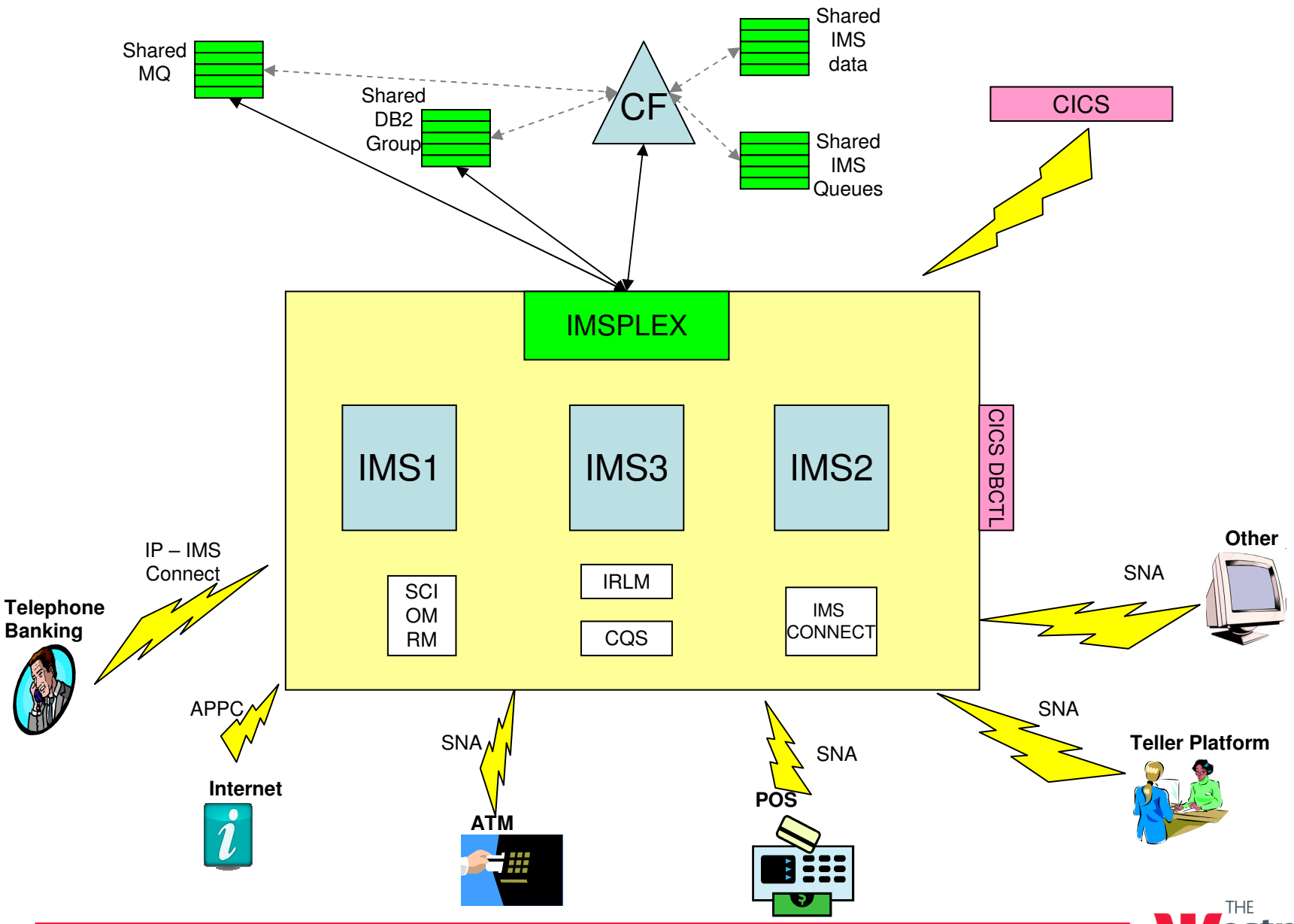
Rationale … cont'd

- XRF since 1990 -1991
- Remove 2 minute impact on switch to XRF
- Increasing capacity ($$$) needs for tracker IMSes
  - 1 large LPAR vs shared capacity over IMSPLEX
- Becoming increasingly problematic
  - XRF failures/issues increase since 2007
    - NOV 2007 IMS DB corruption
  - IMSV10 upgrade Jan 2009
    - IMS failures over XRF switch
  - IMS Shared Queues Aug 2010
    - Regular IMS XRF tracking failures per day

= **remove XRF and add shared IMSPLEX**

Target IMS Environment

Target IMS Environment - IMS Sysplex Conceptual View



Target IMS Environment

- Cloned IMS systems
- IMS shared queues
- Application changes
- Duplex enabled CF structures
- Shared data – DB2 & IMS
- MQ shared queues
- CICS shared access
- IMS Connect distribution
- Additional LPAR for new IMS + subsystems – DB2 & MQ
- VGR & APPC GR
- BMP “run anywhere”

Stages of Implementation

WBC Stages of Implementation

- Summary of Steps … (in order)
  - Proof of Concept
  - Coupling Facility setup
  - New address spaces
  - Data Sharing – IMS & DB2
  - MQ shared queues
  - CICS link changes
  - IMS system definition changes
  - IMS queue sharing
  - New LPAR for new extra IMS system
  - Convert BMP to “run anywhere” in IMSPLEX
  - VGR plus APPC Generic resource +
  - Remove XRF
  - IMS Connect
  - Development environments

Proof of Concept

- Build 2 way IMSPLEX
  - 1 IMS per LPAR
- Implement
  - CF Setup
  - MQ and DB2 shared queues
  - CICS shared links
  - IMS DB sharing
  - IMS shared queues
  - VTAM Generic Resources & APPC Generic Resources
  - XRF variations for migration scenarios
  - XRF (uservar) & VGR mutually exclusive

Coupling Facility Setup

- 1 CF per mainframe
- CF structures split over multiple CFs for performance
- Not duplexed – performance issues
  - Added overhead for IMS to write to 2 sets of structures
  - Plus extra DASD write to staging CQS datasets for DR DASD mirroring e.g.
    - STR1 & STR1DUP
    - STR2 & STR2DUP etc.
    - Staging dataset DASD I/O

Coupling Facility Setup … cont'd

- IMS usage
  - CQS (Common Queue Server) structures
    - To manage IMS messages in CF
  - IMS data structures
    - To manage data base locks & buffers in CF
  - RM (Resource Manager) structures
    - To manage IMS resources in CF
  - OM (Operations Manager) audit trail structures

New Address Spaces

- OM (Operations Manager) & SCI (Structured Call Interface)
  - Required for SPOC & type 2 commands
  - Required for OM audit trail
- IRLM
- CQS
  - Staging dataset used for DR DASD mirroring
- RM

New Address Spaces … cont'd

IRLM

- Deadlock detection =1 second cycle
- LOCKTIME = 350 seconds
  - Originally much lower - One DBCTL application forced increase
- U3310 if LOCKTIME reached/exceeded
- DFSERA10 + SMF type 79 subtype 15
  - View U3310 detail

New Address Spaces … cont'd

RM

- Used to manage IMS resources across the IMSPLEX
  - Transaction serialisation
  - STM (Sysplex Terminal Manager)
  - Global status for transactions, databases and areas

DB2 Data Sharing

- Convert the single local DB2 on one IMS
- DB2 data sharing group over 3 LPARs
  - Later 4 LPARs with add of new LPAR & IMS
    - To cater for XRF lpar as interim measure
- Application changes e.g. SPOC jobs to execute across all IMS systems
- DB2 access no longer restricted to one IMS
- Simplified application code as DB2 available on all IMS

IMS Data Sharing

- Connect IRLM
- Introduce SPOC jobs in application processes to cater for DB update on all IMSes
  - Issue commands across PLEX instead of specific update IMS to
    - /DBR or /STA or /DBD (not really needed)
- DBRC SHRLEVEL 3 on all IMS DB

IMS Data Sharing … cont'd

- IMS data base definitions changed to UPDATE on all IMS
  - Over 1,000 databases changed
  - Phased over 4 months
  - Grouped by logical applications
  - IMS utilities updated
    - e.g. Change Accum
- Benefits
  - Load sharing
  - Multiple updaters
  - Integrity – GG status
  - Flexibility – moving BMPs & MPPs
  - Increased capacity
  - All IMS data may be shared

MQ Shared Queues

- Convert 3 local MQ subsystems to MQ shared queues over 3 LPARs
  - Later 4 LPARs with add of new LPAR & IMS
- Convert application local queues to global queues
- Definitions in DB2 shared group for MQ messages >63K
- Applications required changes to use default Queue Manager name instead of hard coded queue manager name
  - CSQQODEV defined by MQ team
- Application no longer tied to specific LPAR due to the local MQ

CICS Link Changes

- CICS systems accessible from any IMS
- LU61
  - VGR implemented
    - All sessions initiated from CICS
    - One link per CICS to the IMSPLEX
    - Connected to one IMS at any point in time
- LU62
  - Generic APPC implemented
    - Session inbound from CICS joins the VGR and connects to ANY IMS
    - Session outbound from IMS to CICS needs to set up LU62 links from each IMS to each CICS

IMS System Definition Changes

- Fully DRD (Version 10 implementation)
- Clone application definitions, includes
  - Tran, program, DB
  - Descriptors
  - ACB, MFS
- Ensure all transaction are defined local (2,680 transactions changed)
  - No application code dependency on specific IMS
- Introduce new class structure e.g.
  - Class 101 for IMS1 only
  - Class 201 for IMS2 only
  - Class 301 for IMS3 only
  - Class 1 for any IMS
- Remove MSC requirements (and later link definitions)
- All changes retrofitted into Westpac IMS repository

IMS Queue Sharing

- Shutdown IMS systems (1 at a time)
- Start CQS
- Introduce SQ definitions
- Cold start IMSes
- Implement RM for serial processing across PLEX
  - Define PGM as Serial for PLEX serialisation
- OTMA/APPC affinity issue – UQ60884
  - Backend TRAN processing on non input IMS would fail

New LPAR + New Extra IMS

- Shared spool to use WLM & SCHENV parm for BMP workload (later BATCH)
- Start new IMS (fully shared)
- Start new DB2 subsystem (data sharing group)
- Start new MQ subsystem (MQ shared queues group)
- Extend CICS definitions
- Extend automation procedures

BMP Changes

- Convert BMP to run “anywhere” in IMSPLEX
  - No application code dependency on specific IMS
- WLM & SCHENV=IMS across PLEX
  - 3 x IMS shared JES spool
  - Common SCHENV variable available on any IMS
  - When IMS down or IPL in progress, disable scheduling environment on that LPAR
  - Exceptions for special requirements
    - e.g. DBCTL tied to an IMS system use different SCHENV variable
- All BMP jobs in shop JCL updated (15,000 jobs changed)
  - Common class for each LPAR
  - No system affinity coding (removed)
  - XEQ node common
  - IMSID = IMS
  - Add SCHENV=IMS (some exceptions) to the jobcard
- Can move BMP workload with one command
  - e.g. disable variable on specific LPAR

VGR + APPC GR

- VTAM Generic Resources
  - LU0, LU1, LU2, LU61
- APPC (LU62) generic resources
- Use WLM=YES allowing WLM to distribute sessions
- VTAM changes to limit front end channel changes
  - USSTAB changes for native users
  - DEFLOGON changes for NETMASTER users
  - e.g. IMS1 logon becomes IMS VGR logon

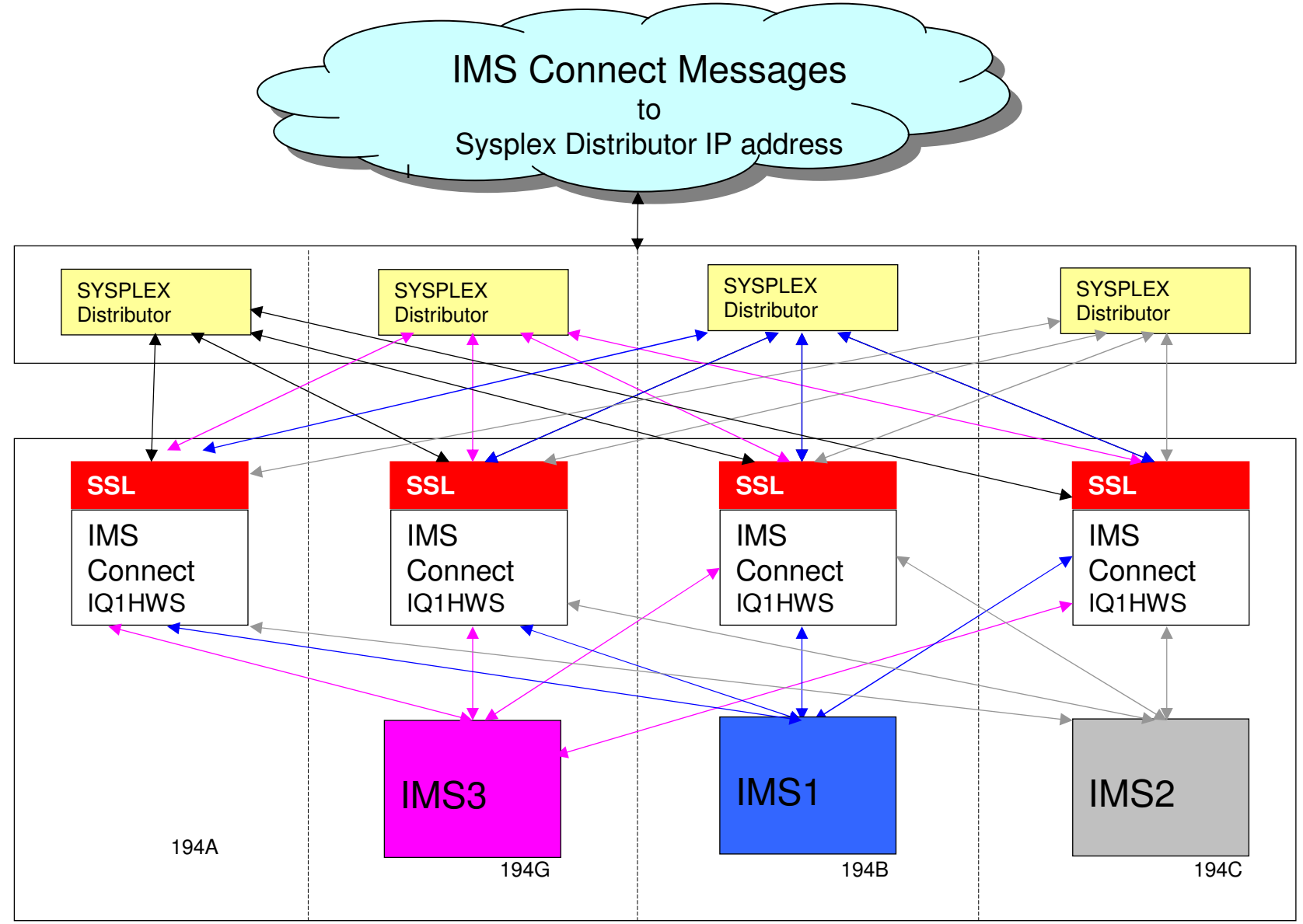
Remove XRF

- Shutdown IMS & XRF tracking systems
- Update parameters
  - DFSPBxxx for IMS & FDBR
  - Remove HSB= from DFSPBxxx (XRF)
- Implement communications changes (VGR)
- Cold start IMS1 & IMS2 (no more XRF)
  - XRF uservar & VGR mutually exclusive
- Start FDBR for old IMS XRF systems

Additional Changes

- Tune transactions
  - Serial trans no longer serial
    - Implement RM for serial across IMSPLEX
  - More parallelism
    - PARLIM doesn't work in the same way as pre shared queues
      - Each IMS has no idea how many transactions queued in global queues
      - Works on how many successful GU in the MPP region

IMS Connect


IMS Connect Messages
to
Sysplex Distributor IP address
SYSPLEX Distributor
SYSPLEX Distributor
SYSPLEX Distributor
SYSPLEX Distributor
SSL
IMS Connect IQ1HWS
SSL
IMS Connect IQ1HWS
SSL
IMS Connect IQ1HWS
SSL
IMS Connect IQ1HWS
IMS3
IMS1
IMS2
194A
194G
194B
194C

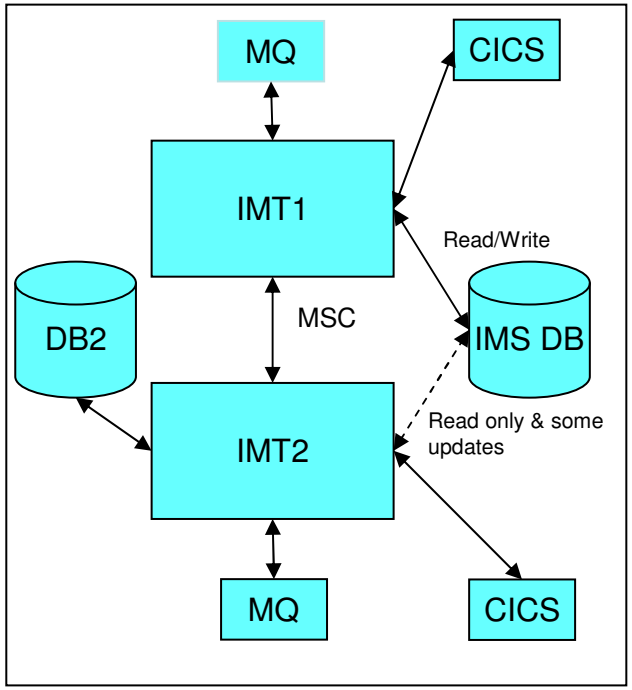
Development Environments

- Maintain mix of DEV environments
  - Build DEV complete target environment
  - Maintain DEV environment in pre IMS sharing form
  - Maintain a Sociability DEV environment
    - Any prod change implemented here before prod
    - Similar to prod status

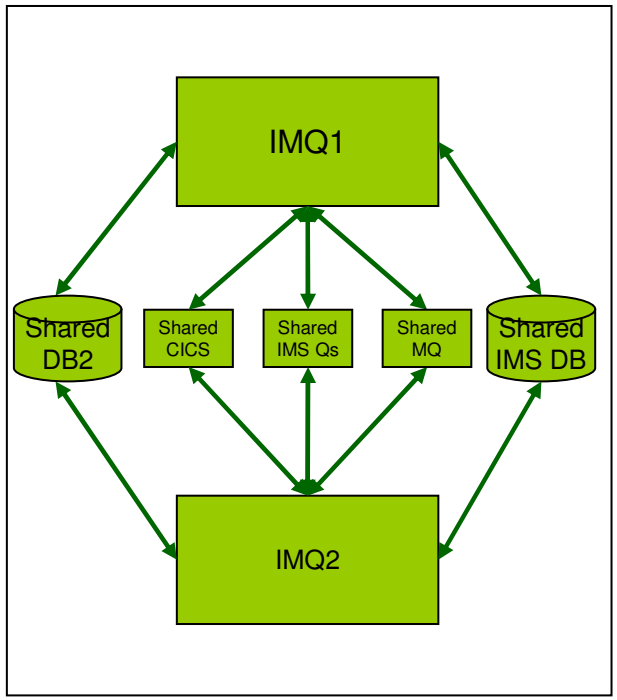
Development Environments

DEV Environments

PRE IMSPLEX



IMSPLEX



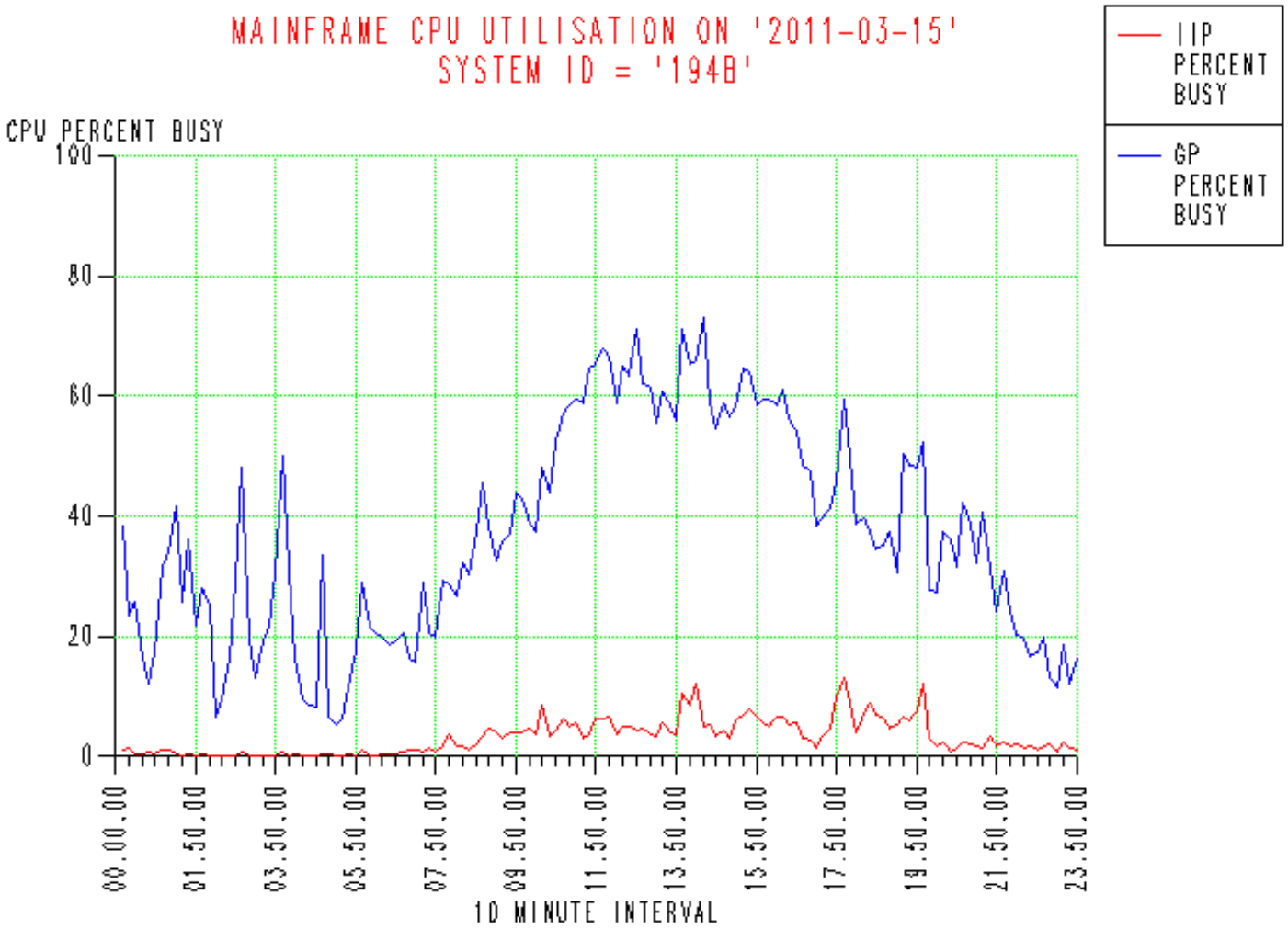
Outstanding Issues

- Testing Global Online Change
  - Presently automation across IMSPLEX for Online Change

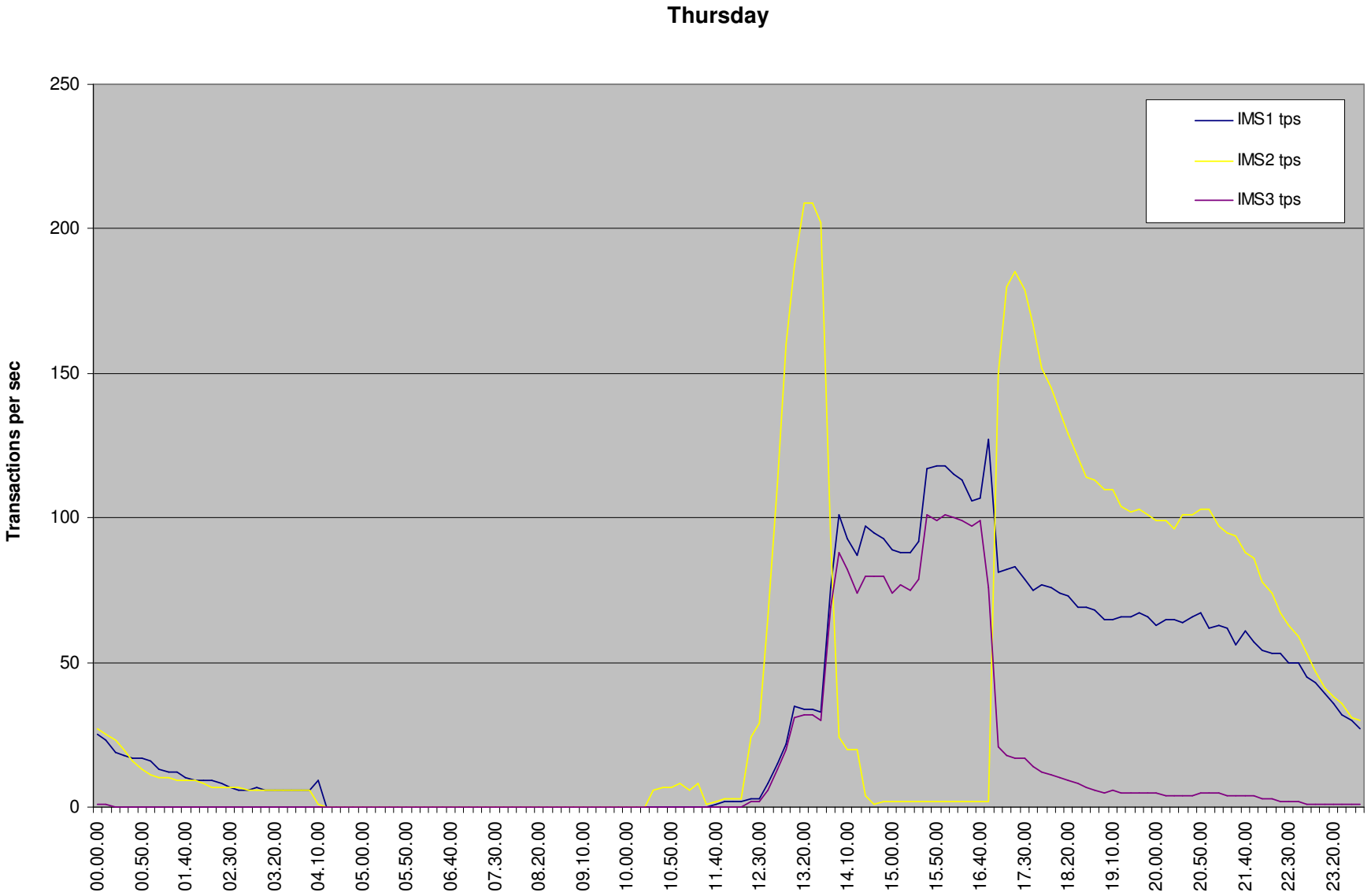
Benefits

- Cycle IMS change through each IMS system
- Use of dynamic features
  - SPOC for definition changes and commands across IMSPLEX
- Global parameters on DB & Tran commands to utilise RM

Capacity after Front End Problems With IMSPLEX



IMS transaction spread utilising IMSPLEX during issue



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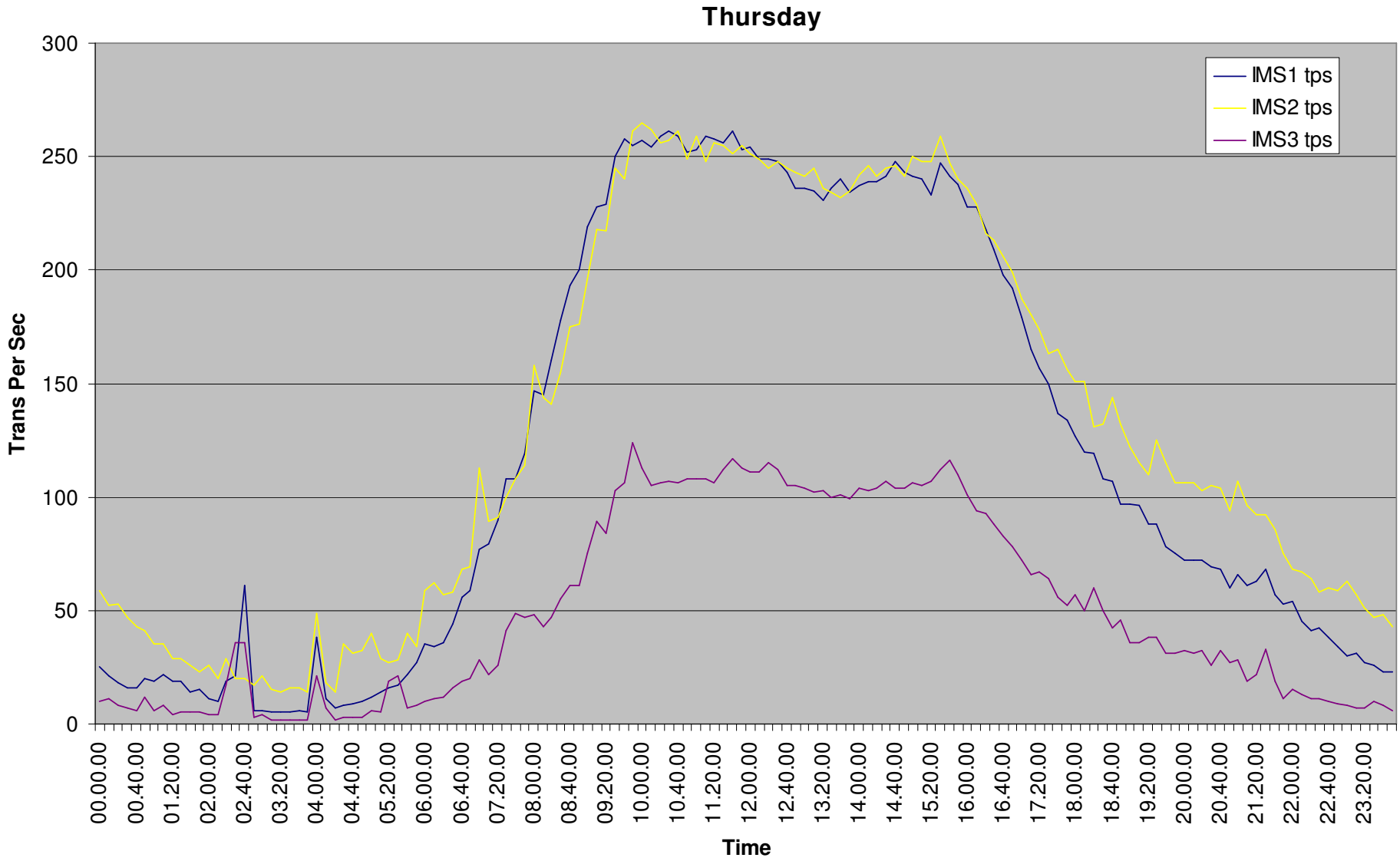
IMS transaction spread with IMSPLEX



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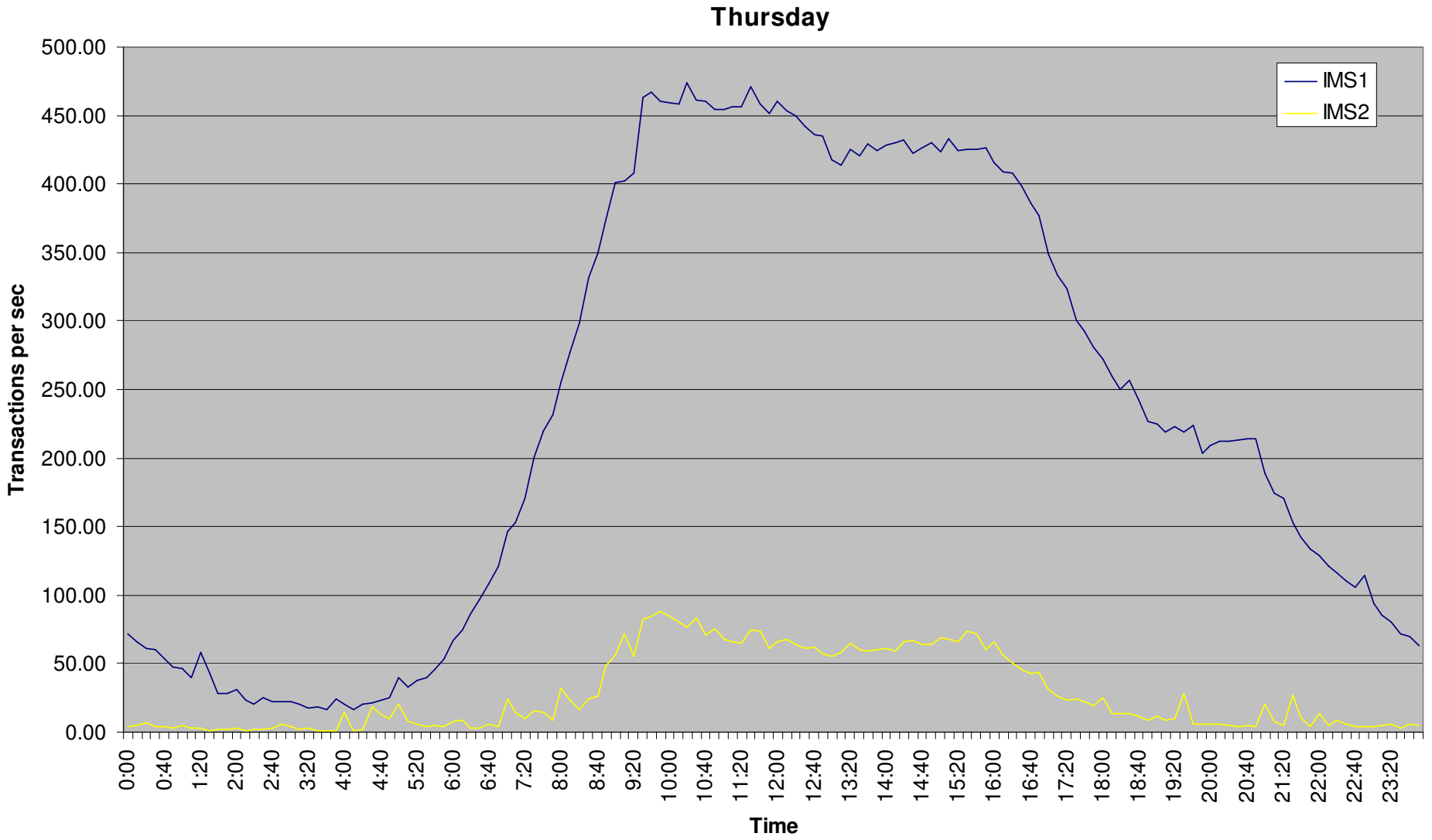
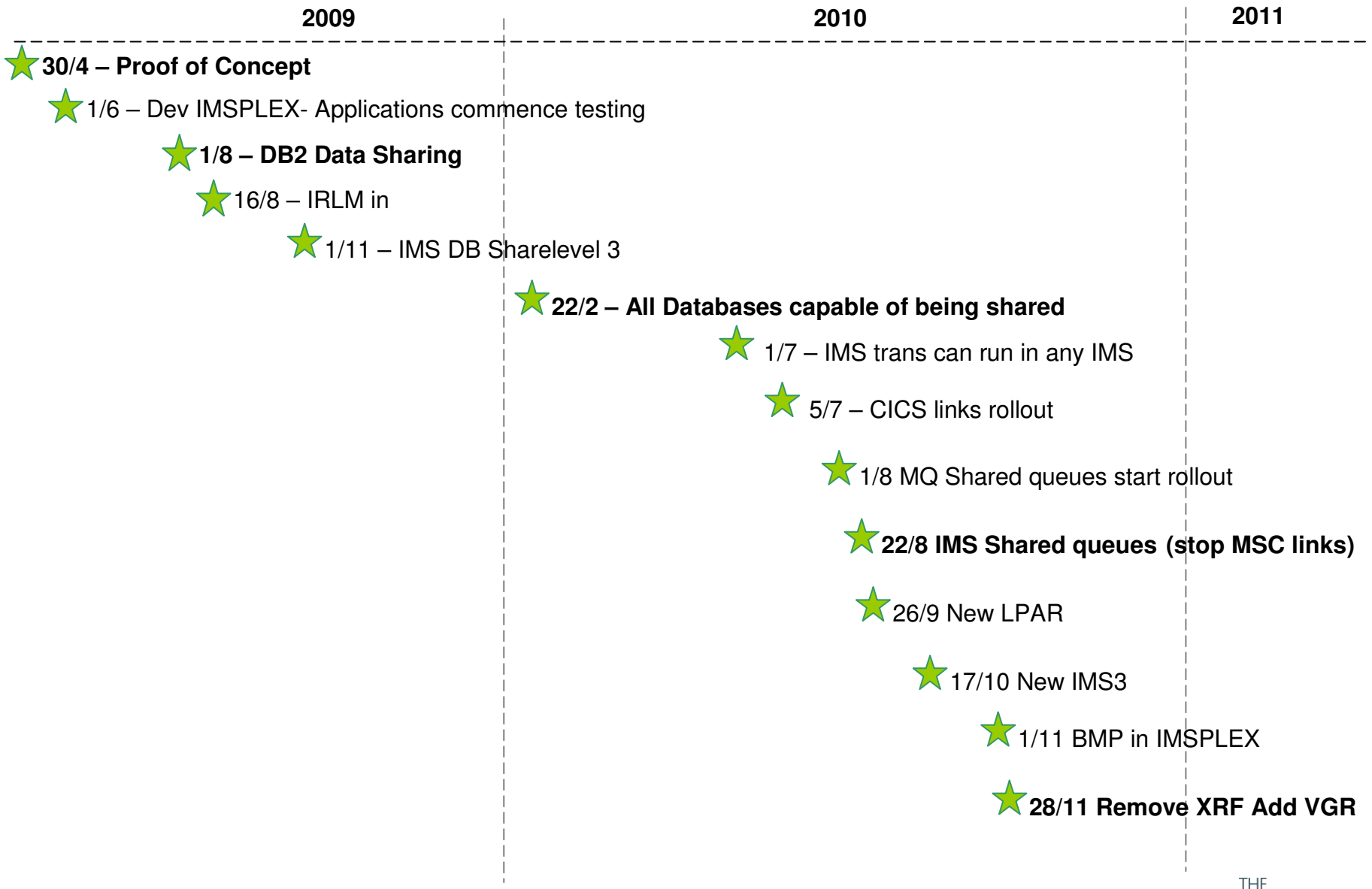
IMS transaction spread before IMSPLEX



TimeLine


2009
2010
2011
30/4 – Proof of Concept
1/6 – Dev IMSPLEX- Applications commence testing
1/8 – DB2 Data Sharing
16/8 – IRLM in
1/11 – IMS DB Sharelevel 3
22/2 – All Databases capable of being shared
1/7 – IMS trans can run in any IMS
5/7 – CICS links rollout
1/8 MQ Shared queues start rollout
22/8 IMS Shared queues (stop MSC links)
26/9 New LPAR
17/10 New IMS3
1/11 BMP in IMSPLEX
28/11 Remove XRF Add VGR

Recommendations

- Small changes over time
  - Several thousand changes
  - Easier to identify problem root cause
  - Easier to gain management confidence
  - Easier to implement via change control processes
  - Readily gain business acceptance
  - Measurable progressive gains
- Implement transparently to applications
  - Requires minimal change by applications
  - Allows schedule to progress
- Implement aiming to provide small gains for the business along the way
  - Long project duration – keeps business happy

Questions

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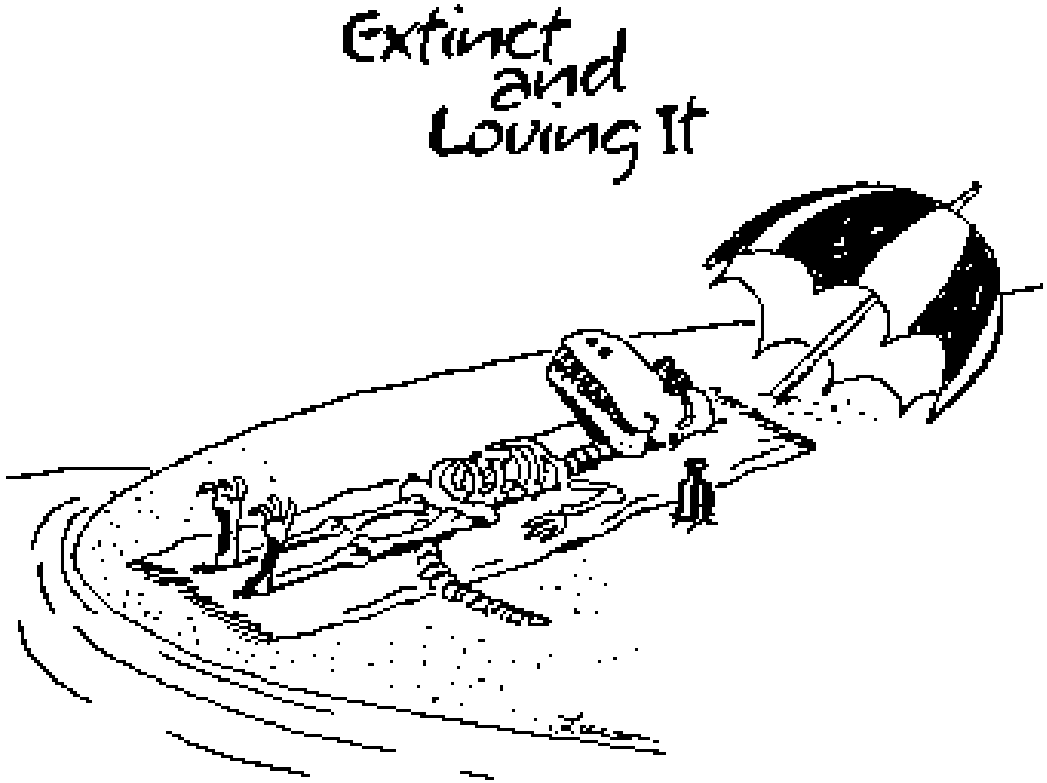

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