



**CITY UNIVERSITY
LONDON**

**Enterprise Architecture and Service Oriented
Architecture:**

**Dreams and Realities – City University's
Registration Project**

John Gallagher
Applications Architect

Chris Roper
IBM Software Group



Why SOA at City University?

- A business need to improve integration between core applications
- A legacy of difficult to support and poorly documented batch and ad-hoc integration
- Data quality issues
- Lack of agility leading to poor customer service





Our Middleware

- Service Orientated Architecture
 - ESB Layer
 - Provide integration capability
 - Route, transform, enrich data
 - Process Layer
 - Automate/Manage business processes
 - Provide visibility
 - Monitor business defined KPI's
 - Provide management information



Business Process Management – what we have

- Model
 - Modeler Publishing edition allows Business Analysts to model processes, define KPI's, run simulations and collaborate with business users via a web interface
- Build
 - WebSphere Integration Developer
 - Rational Application Developer
 - Third party services
- Deploy
 - WebSphere Process Server
 - WebSphere Advanced ESB
 - WebSphere SAP Adaptor
 - STU-TALK

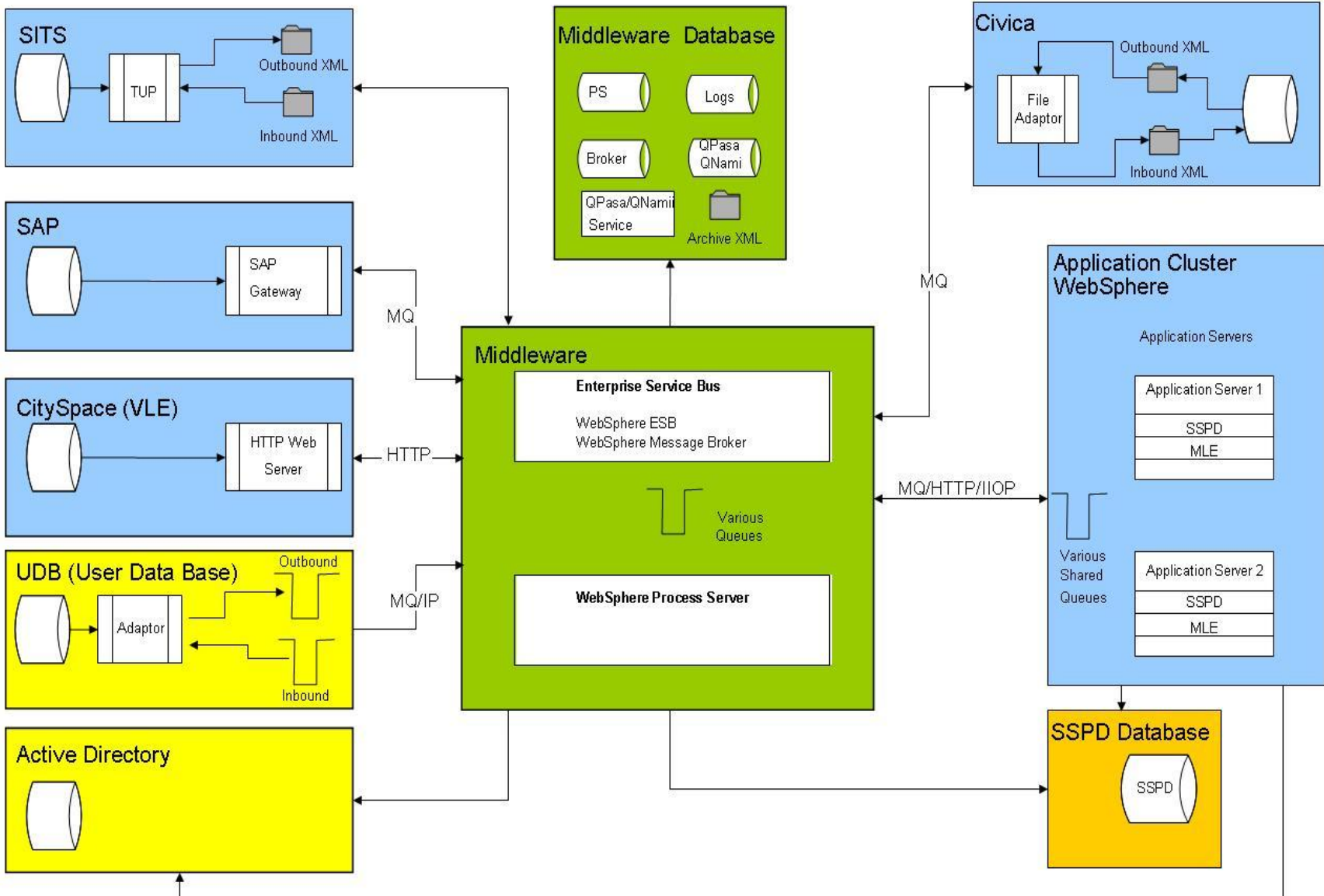


Process Management – what we have

- Monitor
 - Business Monitor
 - Allows us to view status business processes
 - Allows us to feed metrics back to Modeler
 - Dashboard and reporting capability
 - Push to Blackberry
 - Can integrate with corporate monitoring tools
 - User alerts based on KPI thresholds
 - Nagios
 - Infrastructure monitoring



SOA at City University





Has it been successful?

- We have modelled and implemented a number of core processes/services: -
 - Student Records to Identity Management
 - Student Records to Virtual Learning Environment
 - Payments Engine to SAP & SAP to Payments Engine
 - Programme Approvals
- We have addressed some governance and organisational issues associated with the introduction of SOA
- We have more visible processes
- We have a platform to build on

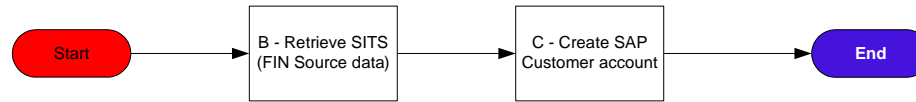


Online Registration

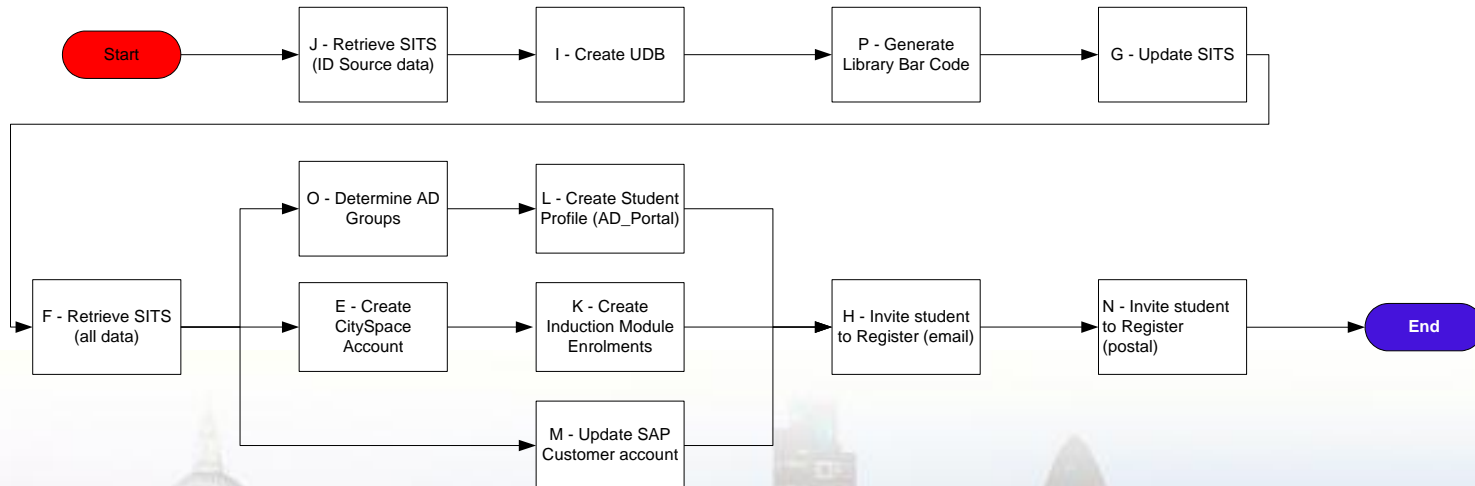
- Project implemented 09/09
- Looks at introducing students into the university
- Consists 5 key parts
 - Pre ATR – students are still applications
 - Post ATR – students have firm offer
 - Core – students have accepted offer and register online
 - Post Registration – students are current and need accounts in various systems
 - Updates – updates to student records system triggers updates in other systems



A-PreRegistrationStart Pre-ATR



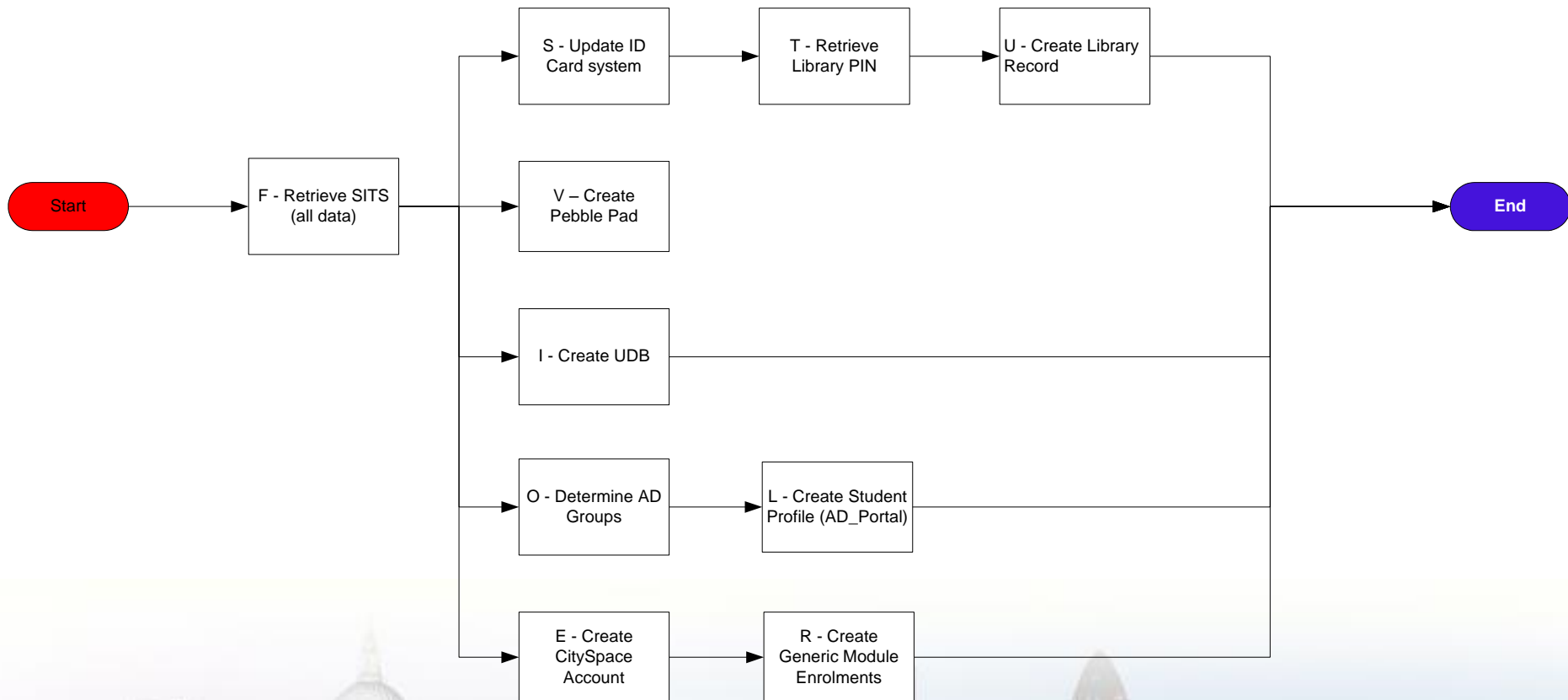
D-PreRegistrationATR Post-ATR





Q-PostRegistration

Post-Reg





Business Modeling - A - PRE-REGISTRATION (start) - IBM WebSphere Business Modeler Advanced Version 6.2 - C:\Documents and Settings\sbbb528.ENTERPRISE\IBM\wbmodeler6.2\workspace5

File Edit Modeling View Search Window Help

Project Tree: Post-Registration, Pre-Registration, Business items, Processes, To-Be Processes, Resources, Organizations, Classifiers, Reports, Queries, Business services, Business service objects, Registration - Updates, Business items, To-Be Processes, W - REGISTRATION-UPD, X - Retrieve SITS (Person), X - Business Fault (No ma), x - Service Fault, x - Business Fault (Incomp), Resources, Organizations, Classifiers, Reports, Queries, Business services, Business service objects

Palette: Annotation, Rectangle, Activities, Task, Human Task, Business Rules..., Process, While Loop, Do-While Loop, For Loop, Gateways, Data, Events

Diagram: B - Retrieve SITS (FIN Source data) (GetFinSourceDataResponseType, TerminationFlag) -> Map to Service:2 (FinChangeCustomerAccountRequestType) -> C - Create SAP Customer account (F, T). Includes Set Termination... (PreATRTerminationData) and StudentApplicantPreATREventKeysType (x-1).

Attributes - B - Retrieve SITS (FIN Source data)

General | Inputs | Outputs | More

This section provides detailed information about the inputs.


Name	Associated data	State
Input	GetFinSourceDataRequestType	

Buttons: Add, Remove

Details



Sample Core Registration Screen



CITY UNIVERSITY
LONDON

Online Registration | Applications

abc221 | Log Out

Online Registration

Online Registration

- Course Details
- Personal Details
- Regulations
- Library PIN
- Fees
- Finish

Course Details

You have received an Unconditional Offer from City University for the following course that you have accepted.

If any details are not what you expect, please contact your [School](#) immediately.

Programme of Study	Mode of Attendance	School	Course Start Date	Course End date
Master of Business Administration Executive MBA	PartTime	CASS Business School	17 Feb 2010	30 Sep 2012

Please Note: School induction events may precede the Course Start Date - check with your school office

[Continue](#)

General enquiries

phone +44 (02)20 7040 5060 enquiries@city.ac.uk Northampton Square, London EC1V 0HB

[Contact us](#) | [Maps](#) | [Privacy](#) | [Freedom of Information](#) | [Copyright & Disclaimer](#) | [About this site](#)



Sample Core Registration Screen

Online Registration

Course Details Personal Details Regulations Library PIN Fees **Finish**

Payment Details

I agree that non-payment of any of my fees by the University deadlines will result in the removal of my access to computing and library services, and may necessitate withdrawal from the course. Following withdrawal, I will remain liable to pay any outstanding debt to the University. I understand that interest or administrative charges may be levied in respect of any delay in the payment of my fees and that legal action may be taken to recover any amount overdue. I also understand that the University may use external agencies to assist in the collection of my fees if I fail to pay by the due dates.

Below is a summary of your Tuition Fees Payable.

Total Fees	£34,500.00
Paid Already (including Deposit)	£0.00
Fee Waiver or Scholarship	£0.00
Sponsorship or non-SLC tuition fees loan	£0.00
Total to Pay	<u>£34,500.00</u>

- 1 - If the Total Fees are not what you expected, please contact your [School](#).
- 2 - If you have paid a deposit or an amount in advance and it is not shown above, please contact the Income Team on 020 7040 3026. Before telephoning please ensure you have allowed sufficient time for any payments to reach us.
- 3 - If you were expecting a Fee Waiver or Scholarship and it is not shown above, please contact your School.
- 4 - If you are sponsored and the sponsorship is not showing above, please ensure you have completed and returned the sponsorship form SP1 to the Income Team.

When you press **either button** you agree to the above statement:

Pay Now

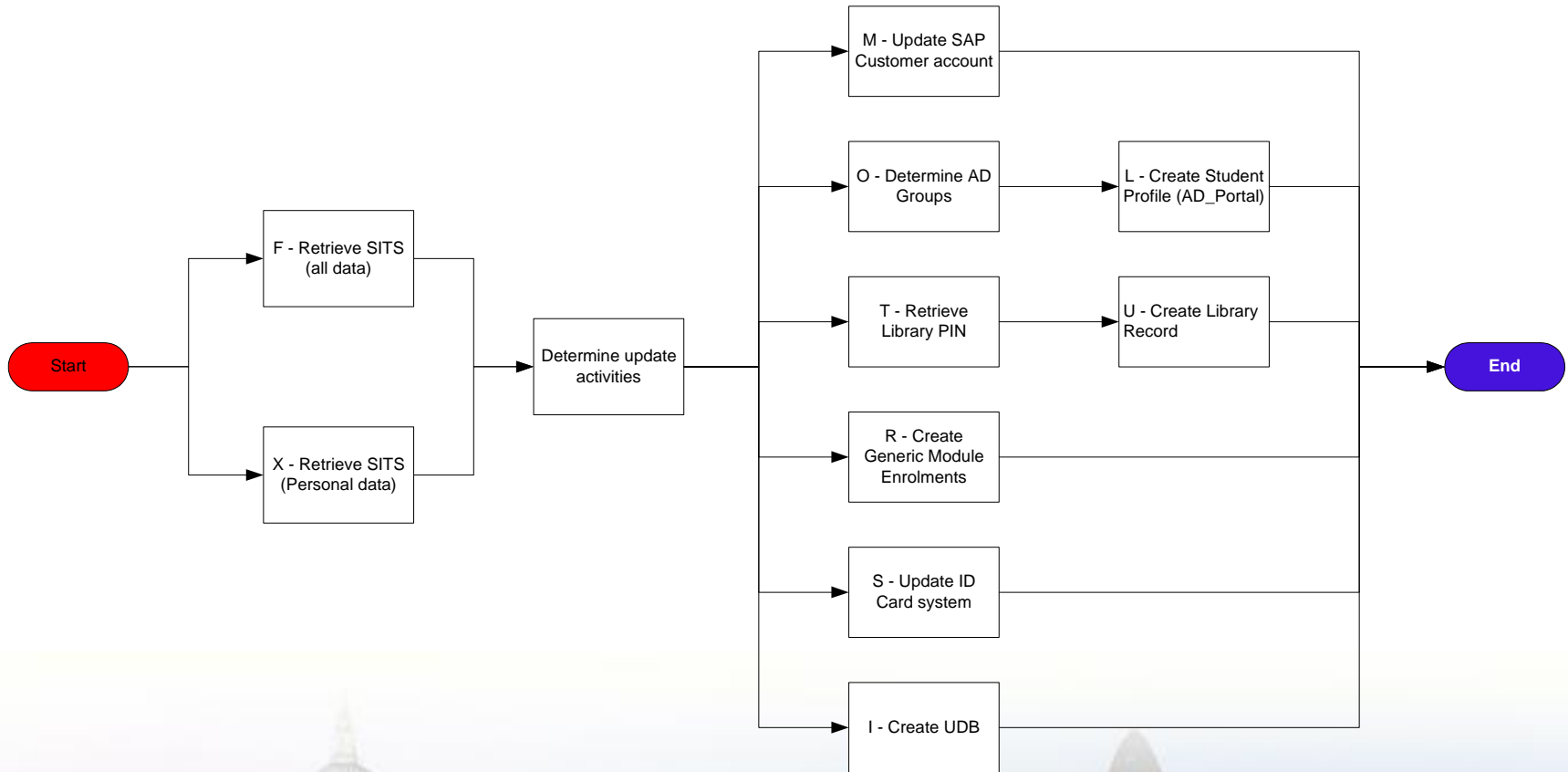
Pay Later

General enquiries

phone +44 (02)20 7040 5060 enquiries@city.ac.uk Northampton Square, London EC1V 0HB



W-RegistrationUpdates





Updates to systems dependant on SITS event 03-08-09

SITS Event	Pithy Name	Trigger Name		SAP	Millennium	Plan	CitySpace	AD/Portal	UDB
Student Contact Details Change (e.g. home or contact address changes)	ChangeStudentContact	HOMEADD or TERMADD	✓	✓	✗	✗	✗	✗	
Student Personal Details Change (Incl. Name change)	ChangeStudentName	STUCHANGE	✓	✓	✓	✓	✓	✓	
Student Personal Details Change (DOB,)	N/A	N/A	✗	✗	✗	✗	✗	✗	
Student Course Details Change	N/A See below	Since students are QSS'd onto new courses see below **	✓	✓	✗	✓	✓	✓	
Student Route &/or Programme Details Change (but Course Code stays the same)	N/A	STUDCHANGE	✗	✗	✗	() ✓	✗	✗	
Change Mode of Attendance (as a result of Course change)	N/A	Since students are QSS'd onto new courses see below **	✓	✓	✓	() ✓	✓	✓	
Student Completes Course (incl. student withdraws) ie SCE_ENDD is populated	ChangeCompleteCourse	ENDSTU	✓	✗	✗	✗	✗	✗	
Student Changes Fee Status	ChangeStudentFeeStatus	FEESTATUS	✓	✓	✓	✓	✓	✓	
Student has been QSS'd (SCJ = "C", SCE & SPR are "P")	StudentQSSd	** CREATESTU							



CITY UNIVERSITY
LONDON

The University for business
and the professions

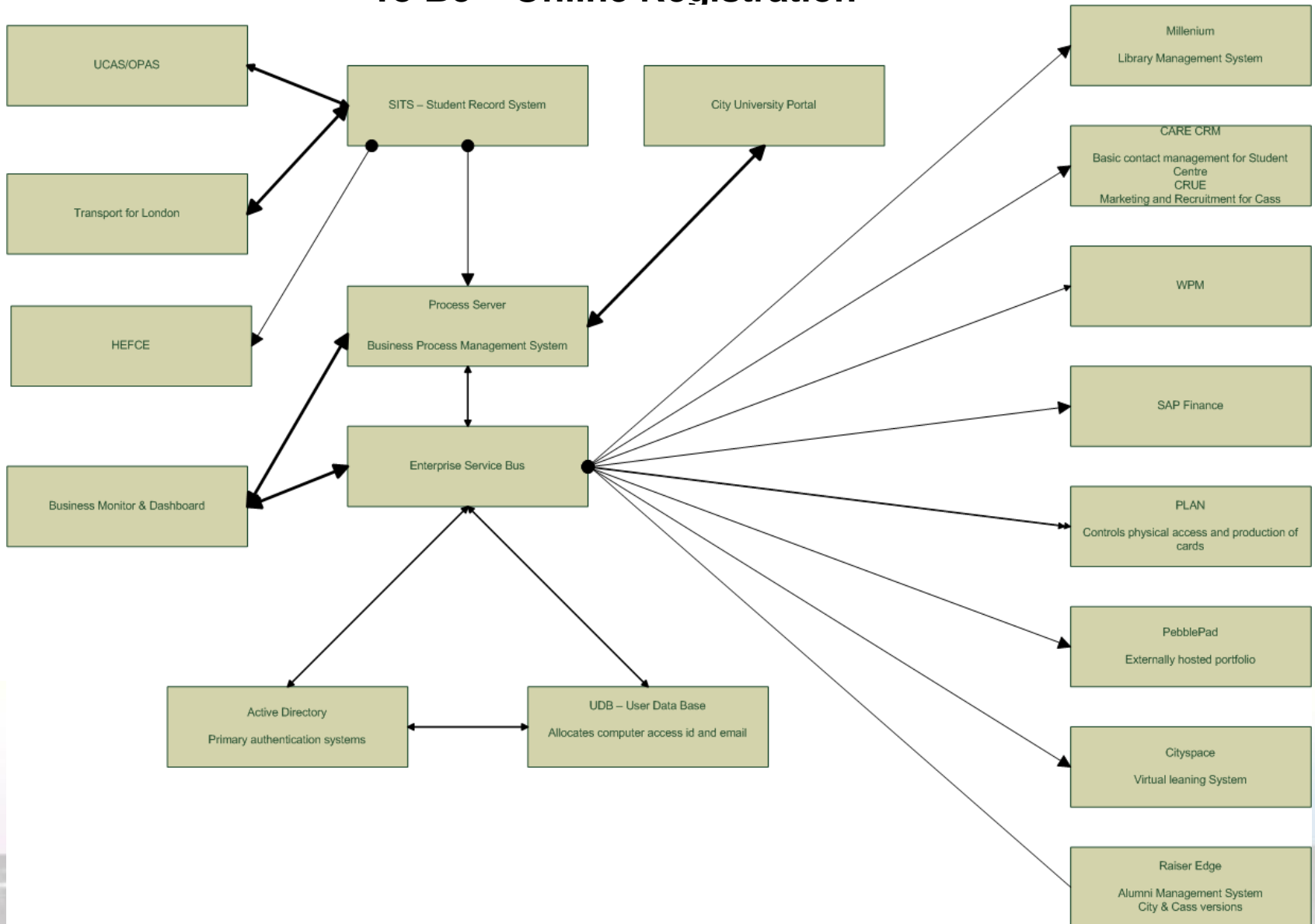
Module Diet Updates

- Delete SMO – user de enrolled on CitySpace module
- Create SMO – user enrolled on CitySpace module





To Be – Online Registration





STUTALK

- We are using two types of integration
 - TUP process generating HTTP post on events
 - Web Services interface to perform CRUD actions
- TUP process
 - DOT -> EOT -> TOT gives recovery points
 - Individual monitors of these records allows performance tuning
 - Uses XET's
- Web Service
 - Clink generic service
 - Uses XET's



Example Soap Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:urn="urn:uniface:applic:wrapped:services:SIW_WSO">
  <soapenv:Header/>
  <soapenv:Body>
    <urn:ACTION>
      <urn:USER>STUTALK</urn:USER>
      <urn:PASSWORD>waremidd1</urn:PASSWORD>
      <urn:PASSKEY></urn:PASSKEY>
      <urn:EXPIRYTIME></urn:EXPIRYTIME>
      <urn:DELIMITER>;</urn:DELIMITER>
      <urn:OPTIONS></urn:OPTIONS>
      <urn:FUNCTION>XET_EXP</urn:FUNCTION>
      <urn:PARAMETERS>XET=GETCOURSEDET</urn:PARAMETERS>
      <urn:INDATA>SCJ_STUC=050024627;SCJ_STAC=C</urn:INDATA>
      <urn:MD5>7B05EDBC8E75CDBFABDDA3B920F16D7B</urn:MD5>
    </urn:ACTION>
  </soapenv:Body>
</soapenv:Envelope>
```



Example Soap Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
```

```
<soapenv:Body>
```

```
<ACTIONResponse xmlns="urn:uniface:applic:wrapped:services:SIW_WSO">
```

```
<return>0</return>
```

```
<EXPIRYTIME>0000-00-00T00:00:00.00+01:00</EXPIRYTIME>
```

```
<DELIMITER>;</DELIMITER>
```

```
<OPTIONS/>
```

```
<FUNCTION>XET_EXP</FUNCTION>
```

```
<PARAMETERS>XET=GETCOURSEDET</PARAMETERS>
```

```
<OUTDATA><![CDATA[<?xml version="1.0" encoding="ISO-8859-1" ?>
```

```
<exchange>
```

```
<SCJ>
```

```
<SCJ.SRS>
```

```
<SCJ_CODE.SCJ.SRS>050024627/2</SCJ_CODE.SCJ.SRS>
```

```
<SCJ_STUC.SCJ.SRS>050024627</SCJ_STUC.SCJ.SRS>
```

```
<SCJ_SEQ2.SCJ.SRS>02</SCJ_SEQ2.SCJ.SRS>
```

```
<SCJ_SPRC.SCJ.SRS>050024627/2</SCJ_SPRC.SCJ.SRS>
```

```
<SCJ_AYRC.SCJ.SRS>2007/8</SCJ_AYRC.SCJ.SRS>
```

```
<SCJ_MOAC.SCJ.SRS>31</SCJ_MOAC.SCJ.SRS>
```

```
<SCJ_BEGD.SCJ.SRS>2007-08-01</SCJ_BEGD.SCJ.SRS>
```

```
<SCJ_STAC.SCJ.SRS>C</SCJ_STAC.SCJ.SRS>
```

```
<SCJ_EEND.SCJ.SRS>2011-07-31</SCJ_EEND.SCJ.SRS><SCE>
```

```
<SCE.SRS>
```

```
<SCE_SCJC.SCE.SRS>050024627/2</SCE_SCJC.SCE.SRS>
```

```
<SCE_SEQ2.SCE.SRS>02</SCE_SEQ2.SCE.SRS>
```

```
<SCE_STUC.SCE.SRS>050024627</SCE_STUC.SCE.SRS>
```

```
<SCE_AYRC.SCE.SRS>2008/9</SCE_AYRC.SCE.SRS>
```



Example Soap Request (cont.)

```
<SCE_CRSC.SCE.SRS>CECPRG</SCE_CRSC.SCE.SRS>
<SCE_PRGC.SCE.SRS>CECTPRG01</SCE_PRGC.SCE.SRS>
<SCE_ROUC.SCE.SRS>CSCTED</SCE_ROUC.SCE.SRS>
<SCE_BLOK.SCE.SRS>12</SCE_BLOK.SCE.SRS>
<SCE_OCCL.SCE.SRS>BJ</SCE_OCCL.SCE.SRS>
<SCE_MOAC.SCE.SRS>64</SCE_MOAC.SCE.SRS>
<SCE_STAC.SCE.SRS>DO</SCE_STAC.SCE.SRS>
</SCE.SRS>
</SCE>

</SCJ.SRS>
<SCJ.SRS>
<SCJ_CODE.SCJ.SRS>050024627/3</SCJ_CODE.SCJ.SRS>
<SCJ_STUC.SCJ.SRS>050024627</SCJ_STUC.SCJ.SRS>
<SCJ_SEQ2.SCJ.SRS>03</SCJ_SEQ2.SCJ.SRS>
<SCJ_SPRC.SCJ.SRS>050024627/3</SCJ_SPRC.SCJ.SRS>
<SCJ_AYRC.SCJ.SRS>2008/9</SCJ_AYRC.SCJ.SRS>
<SCJ_MOAC.SCJ.SRS>01</SCJ_MOAC.SCJ.SRS>
<SCJ_BEGD.SCJ.SRS>2008-09-15</SCJ_BEGD.SCJ.SRS>
<SCJ_STAC.SCJ.SRS>C</SCJ_STAC.SCJ.SRS>
<SCJ_EEND.SCJ.SRS>2009-10-31</SCJ_EEND.SCJ.SRS><SCE>
<SCE.SRS>
<SCE_SCJC.SCE.SRS>050024627/3</SCE_SCJC.SCE.SRS>
<SCE_SEQ2.SCE.SRS>01</SCE_SEQ2.SCE.SRS>
<SCE_STUC.SCE.SRS>050024627</SCE_STUC.SCE.SRS>
<SCE_AYRC.SCE.SRS>2008/9</SCE_AYRC.SCE.SRS>
<SCE_CRSC.SCE.SRS>BUPBIF</SCE_CRSC.SCE.SRS>
<SCE_PRGC.SCE.SRS>BUMSBIF02</SCE_PRGC.SCE.SRS>
<SCE_ROUC.SCE.SRS>PSBIFN</SCE_ROUC.SCE.SRS>
<SCE_BLOK.SCE.SRS>11</SCE_BLOK.SCE.SRS>
```



Example Soap Request (cont.)

```
<SCE_OCCL.SCE.SRS>AJ</SCE_OCCL.SCE.SRS>  
<SCE_MOAC.SCE.SRS>01</SCE_MOAC.SCE.SRS>  
<SCE_STAC.SCE.SRS>C</SCE_STAC.SCE.SRS>  
</SCE.SRS>  
</SCE>  
  
</SCJ.SRS>  
</SCJ>  
</exchange>]]></OUTDATA>  
  <MESSAGETEXT>Exporting data to an XML stream...  
Processing XSL transforms...</MESSAGETEXT>  
  <MD5>7B05EDBC8E75CDBFABDDA3B920F16D7B</MD5>  
</ACTIONResponse>  
</soapenv:Body>  
</soapenv:Envelope>
```



SITS:Vision Menus - ETL - [MEN_XET]

File Edit Goto Misc Other Help

STUTALK City University - ETL 08/Sep/2009
MEN12 XML Exchange Template (XET) MEN_XET

38 of 47 Exchange Template records

XET Code	SETSTUSTATUS	In Use?	<input checked="" type="checkbox"/>
Short Name	SETSTUSTATUS		
Full Name	SET STUDENT STATUS - SITS 8.2.0 V1.0 (Live)		
Dictionary	SRS	SITS:Vision Students	
Entity	SCE	Student Course Block Enrolment	
Valid for Import	<input checked="" type="checkbox"/>	Schema Type	<input type="radio"/> Document Type Definition
Valid for Export	<input checked="" type="checkbox"/>		<input type="radio"/> XML Schema Definition
		Include Schema	<input type="checkbox"/>

Exchange Text

```
<exchange>
  <srs_sce>
    <exchangefields>
      <sce_scyj.sce.srs/>
      <sce_seq2.sce.srs/>
      <sce_stac.sce.srs/>
    </exchangefields>
    <exportdetails>
      <exportactions>
        <hitrage>-1</hitrage>
      </exportactions>
      <retrieveprofile>
        <sce_scyj.sce.srs>*</sce_scyj.sce.srs>
      </retrieveprofile>
      <fieldformatting>
        </fieldformatting>
      </exportdetails>
    <importdetails>
      <importactions>
        <preview>F</preview>
        <alter>T</alter>
        <create>F</create>
        <switch>4</switch>
      </importactions>
      <defaultvalues>
        </defaultvalues>
      <fieldformatting>
        </fieldformatting>
      </importdetails>
    </srs_sce>
  <cams_spr>
    <exchangefields>
      <spr_code.spr.cams/>
      <sts_code.spr.cams/>
    </exchangefields>
    <exportdetails>
      <exportactions>
        <hitrage>-1</hitrage>
      </exportactions>
      <retrieveprofile>
        <spr_code.spr.cams>##SCE_SCJC.SCE.SRS##</spr_code.spr.cams>
      </retrieveprofile>
      <fieldformatting>
        </fieldformatting>
      </exportdetails>
  </cams_spr>
</exchange>
```

Output Schema Text

Start | 4 SAP Logon for ... | Oracle SQL Develo... | SITS:Vision Menu... | SITS:Vision Forms ... | GETSTUDET1 - SC... | << >>



Lessons Learnt

- We need to rethink how we work: -
 - Our Business Analysts need to understand the enterprise
 - Our approach to testing
- Highlights issues in: -
 - Organizational structure
 - Broken business processes
 - Data Quality
 - Makes visible all the manual work arounds
- Did our Senior Management realize the full implications
- Change Management in the business
- Not a quick win project



What Next for City University?

- Further integrate services re-using the infrastructure and data
 - enhancements to programme approvals process (with JISC)
 - Student feedback
 - Graduation
 - Exams
 - Finance & HR processes
- Exploit online service provision through portal technology (WebSphere Portal, Lotus Forms and Lotus Collaboration – Connections & QuickR)
- Exploit collaboration (Business Modeler Publishing Edition) and enhance process improvement (Business Monitor)
- Further build the development and support team and document and extend our Enterprise Architecture



**CITY UNIVERSITY
LONDON**

The University for business
and the professions

Questions?