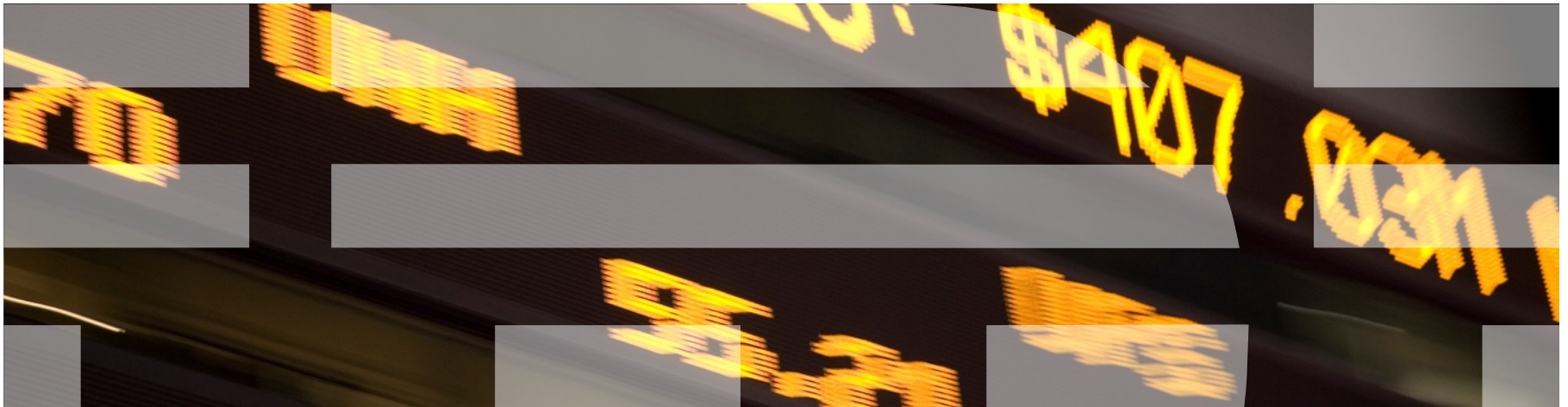


Application Modernization

Re-modeling for your Enterprise

SHARE Session 8655



Abstract

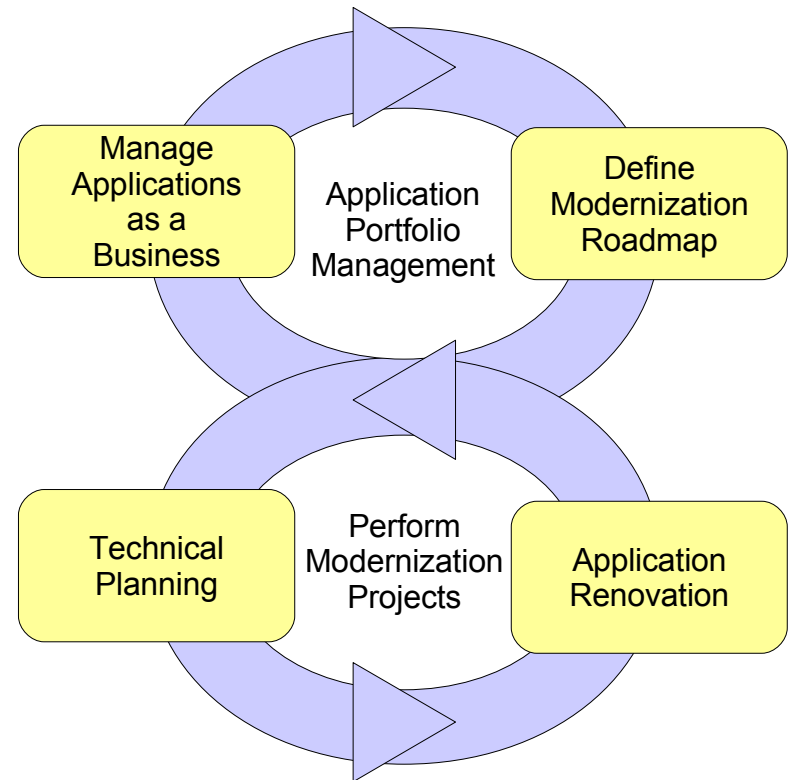
Application modernization. In order for businesses to ensure that their applications remain up-to-date, vibrant, relevant, and contributing to the financial success of the organization, application development teams need to pay attention to maintaining and enhancing the applications that keep the business running.

In this session, we will discuss the often over-looked topic of application modernization. We will cover aspects of application portfolio management, application analysis and assessment, identifying the applications which are most important to the organization, and application renovation.

Managing an application portfolio is an ongoing process. Just like maintenance and remodeling projects in non-IT environments. Come and learn how to focus your attention on the applications that are most critical to your business in order to maximize the effectiveness of your application modernization work.

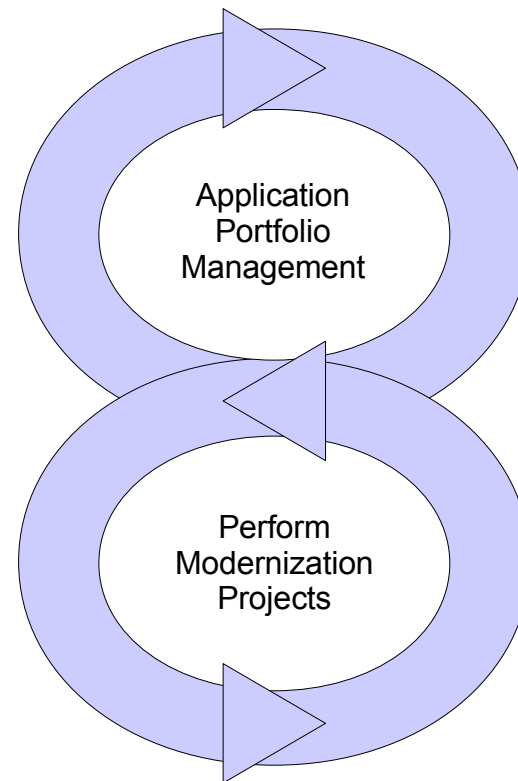
Agenda

- Application Modernization – what is it?
- Manage Applications as a Business
- Define Modernization Roadmap
- Technical Planning
- Application Renovation
- Summary

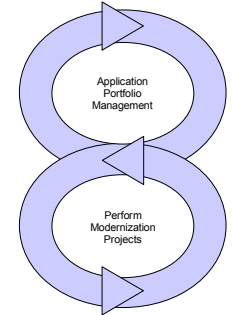


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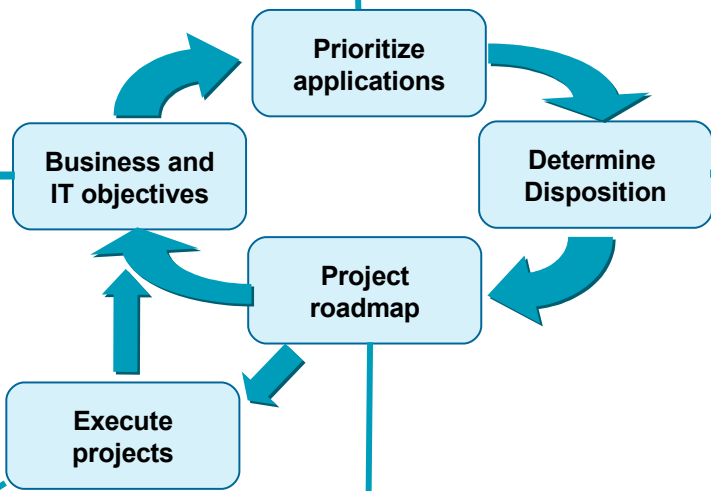
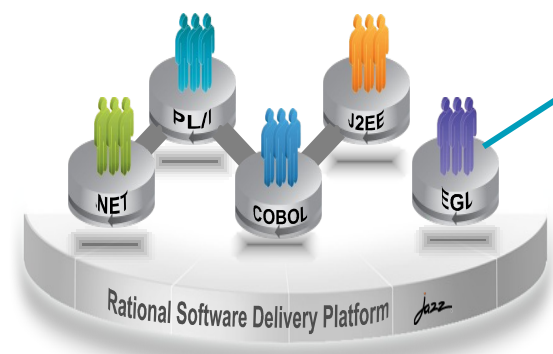
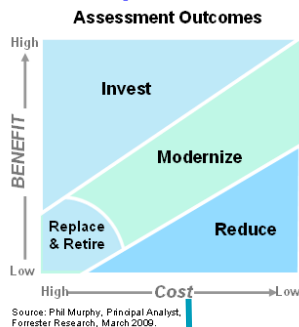
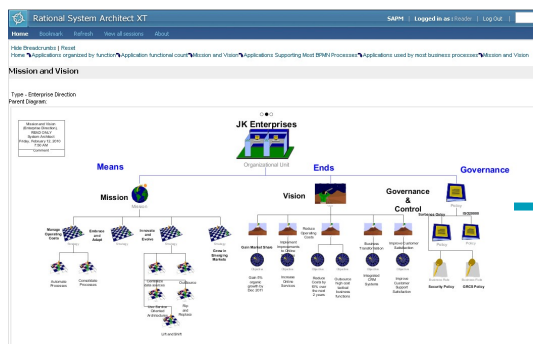
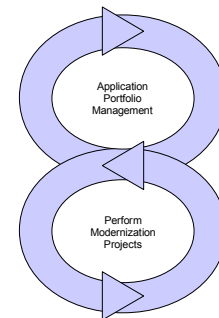
Application Modernization



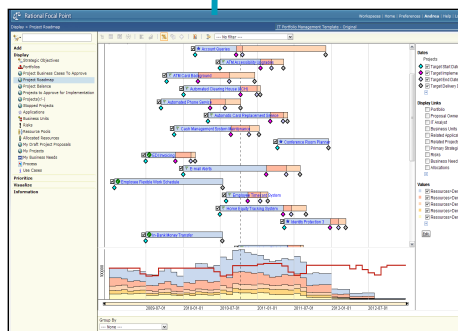
- Manage Applications as a Business
 - Understand your inventory (assets and liabilities)
 - Software applications
 - Systems where that software runs
 - Dependencies between applications
 - Relationship of software to your business
- Define Modernization Roadmap
 - Determine which applications are most important to your business goals
 - Determine what direction to take for your applications
 - Estimate the costs of taking those directions
- Technical Planning
 - Understand existing applications in deep detail
 - Locate relationships between source code and data
 - Identify specific tasks for teams to accomplish
- Application renovation
 - Update, enhance, replace, retire, and so on

Application Modernization is a process for Portfolio Re-vitalization

Business goals, technical and financial analyses drive the approach(es) recommended

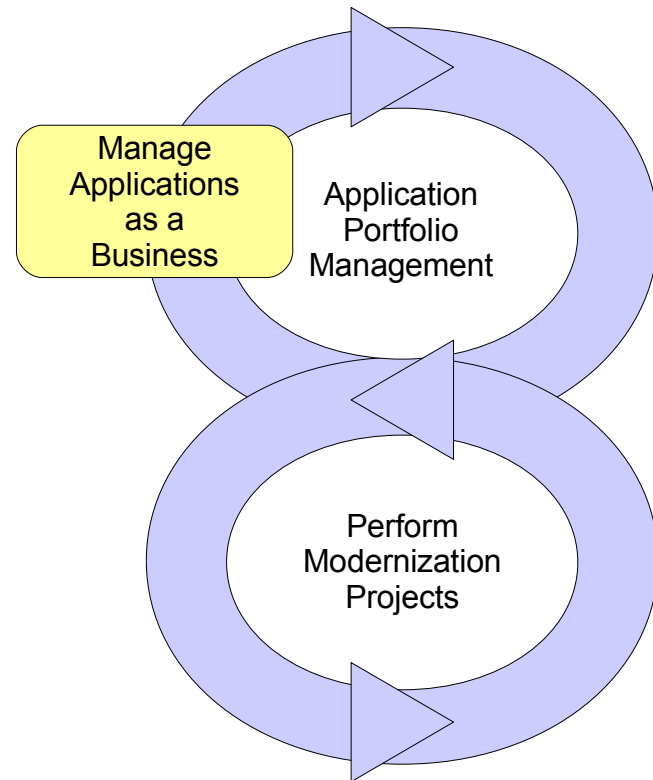


- Retire** (light blue arrow pointing right)
 - Discontinue
 - As-Is
 - Consolidate
 - Upgrade
- Retain** (light green arrow pointing right)
 - Rehost
 - Wrap
 - Convert
 - Refactor
 - Rewrite
- Replace** (light yellow arrow pointing right)
 - Purchase
 - Lease

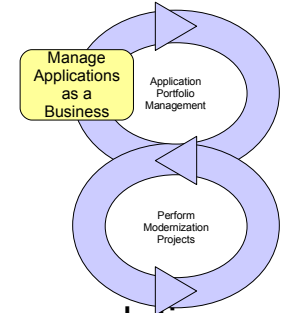


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- Application Modernization – what is it?
- **Manage Applications as a Business**
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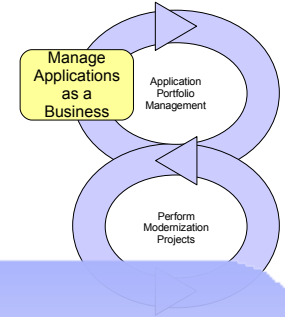
Manage Applications as a Business



- An Enterprise is built over time
 - Projects build upon one another
 - De-centralized teams and a plethora of technology options created many solutions
 - Subtle dependencies may exist between subsystems
 - Different initiatives result in different architectures existing across the IT environment
- Goals
 - Align application investments with current and future business goals
 - Don't over-invest in non-essential applications
 - Invest in important applications
- Tasks
 - Identify your business goals
 - Understand the inventory of applications in use
 - Understand the systems these applications depend upon
 - Understand the dependencies between applications
 - Evaluate the impact of these applications to your business goals
 - Determine which applications are of highest priority to act on (modernize, change investment level, retire, etc.)

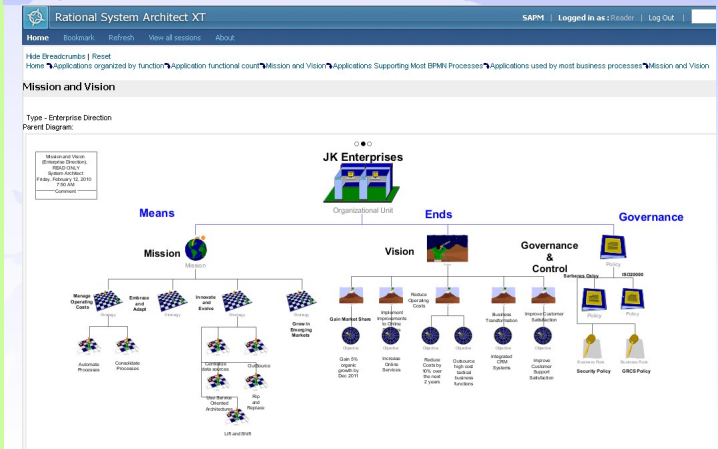
Decide on and communicate key objectives

Enable IT to become a value vs. cost center



Focus revitalization effort on key business objectives, such as

- ✓ Improved business agility
- ✓ Reduce operations and maintenance cost, to free money for investment in strategic initiatives
- ✓ Reduce compliance risk exposure
- ✓ Enable Cloud computing

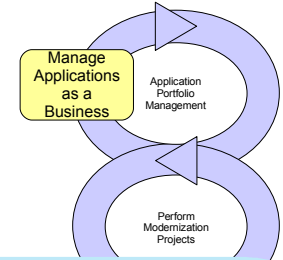


Benefits:

- ✓ Ability to model business objectives, strategies, organization, and processes in IBM Rational System Architect
- ✓ Collaborate on decisions related to organization priorities in IBM Rational Focal Point

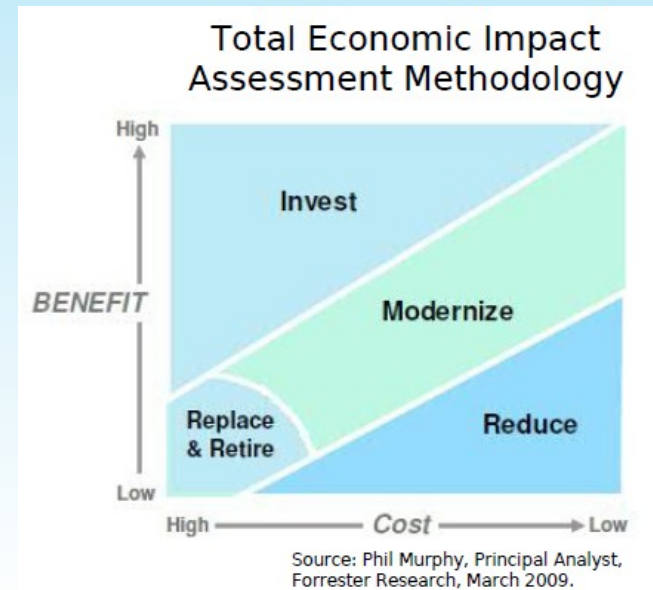
Balance business value to cost and quality

Understand which applications are candidates for modernization



Which applications are

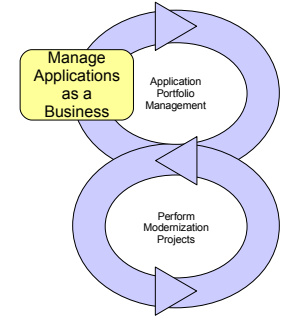
- ✓ the most valuable to the business?
- ✓ the most costly to maintain and operate?
- ✓ misaligned with target enterprise architecture?
- ✓ causing the most incidents?



Benefits:

- ✓ An application inventory with information about business and technical alignment (in Focal Point)
- ✓ A list of target applications most likely to benefit from revitalization (in Focal Point)
- ✓ Enterprise Architecture (in System Architect) linked to a decision engine (in Focal Point)

Manage Applications as a Business



- Outcomes

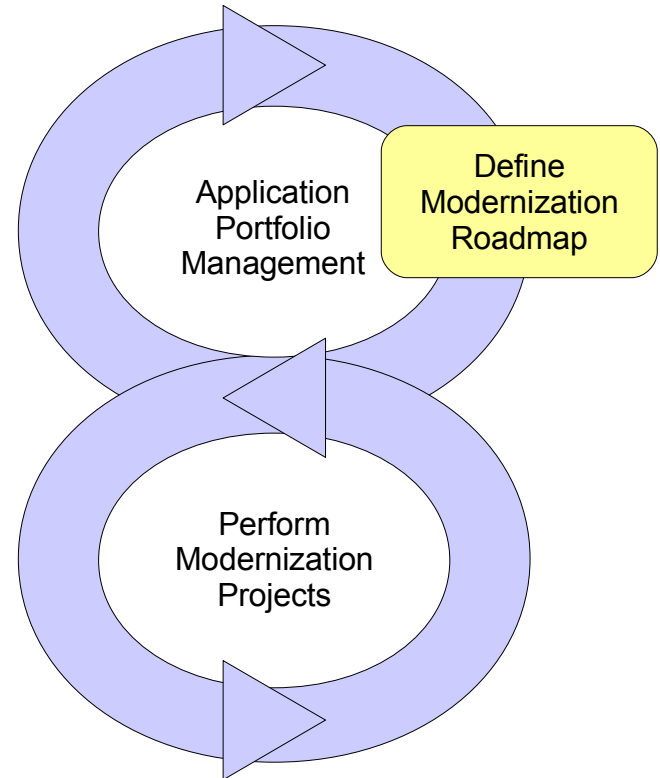
- An accurate inventory of applications, infrastructure, and dependencies
- An understanding of the business goals of the organization and how they relate to the application inventory
- A prioritized list of applications to further investigate, with a candidate type of high-level action (modernize, change investment level, retire, etc.)

- Next steps

- Do deep dive analysis of prioritized applications to determine path to follow
 - Estimated costs of each approach
 - Estimated benefits of each approach
 - Dependencies for each approach
 - Which modernization strategy to implement

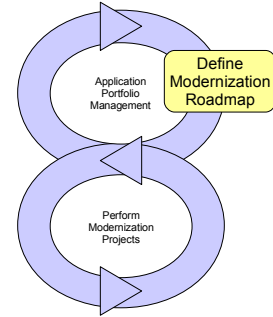
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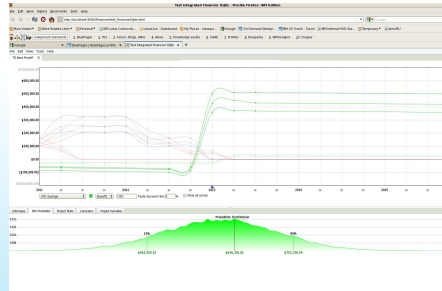
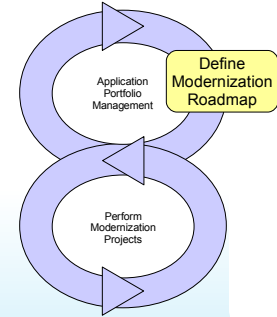
Define Modernization Roadmap

- Like any potential project, pros and cons must be considered
 - Is it worth working on the application?
 - What type of work should we do?
 - Will the work I perform pay off? When?
- Goals
 - Identify the relative importance of applications to business goals
 - Identify applications to renovate
 - Identify the appropriate approach to renovation (retain, retire, replace)
- Tasks
 - Perform static analysis of the applications to understand
 - Size
 - Complexity
 - Maintainability
 - Relationships
 - Outline modernization options with pros and cons
 - Compare the costs and expected benefits of different renovation methods
 - Determine the path to take for each renovation project



Business intelligence for applications

Determine modernization approach through technical and financial analysis to compare alternatives



Financial Analysis

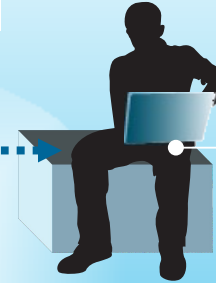
Enterprise Architecture



Decision Engine



Operational Data and Defects



Application Intelligence

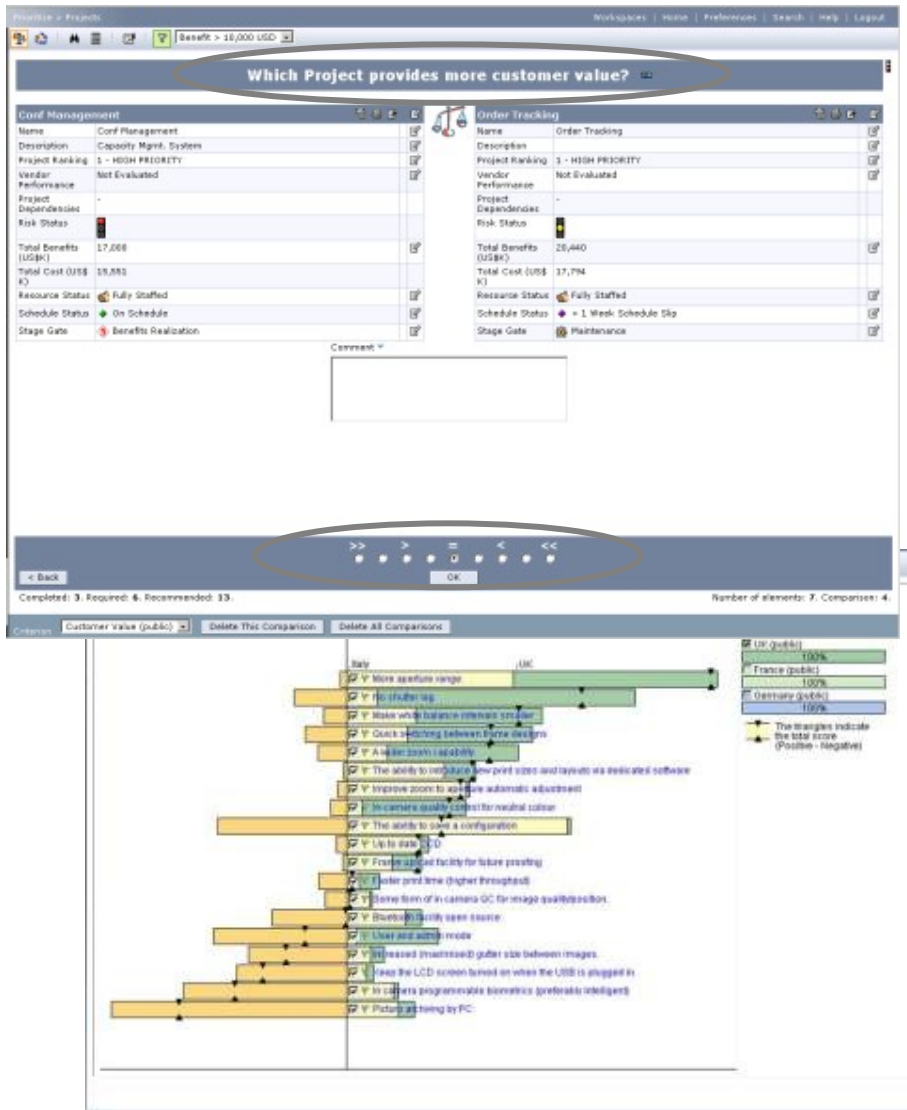
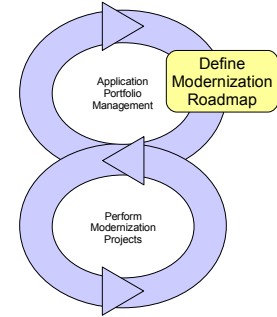
Application Artifacts
Mainframe Distributed

Rational Asset Analyzer
 Rational System Architect
 Rational Focal Point
 Rational Software Architect

Benefits:

- ✓ Improved ROI by understanding technical quality to aid modernization decision, combined with financial option analysis, cognizant of the inherent uncertainty involved
- ✓ Reduced risk by quickly determining the full impact of proposed changes and lowered costs via dead code elimination, optimal planning, focused testing and faster development

Evaluate Different Opportunities and Solutions



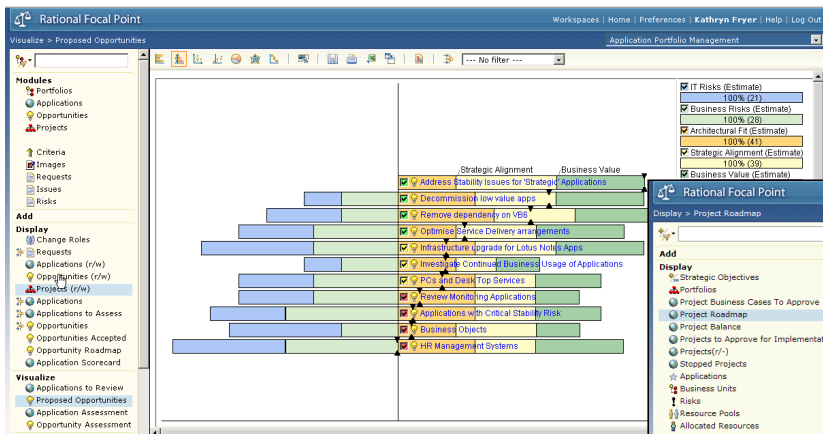
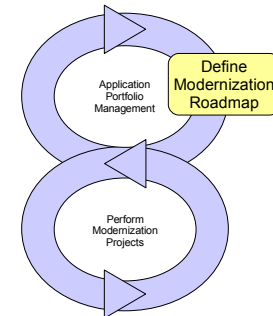
- ▶ Outline modernization options, considering among others cost, resources, benefits, and risk.
- ▶ Choose projects that achieve business objectives, with highest value, in the shortest time, with the least risk

"Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted"

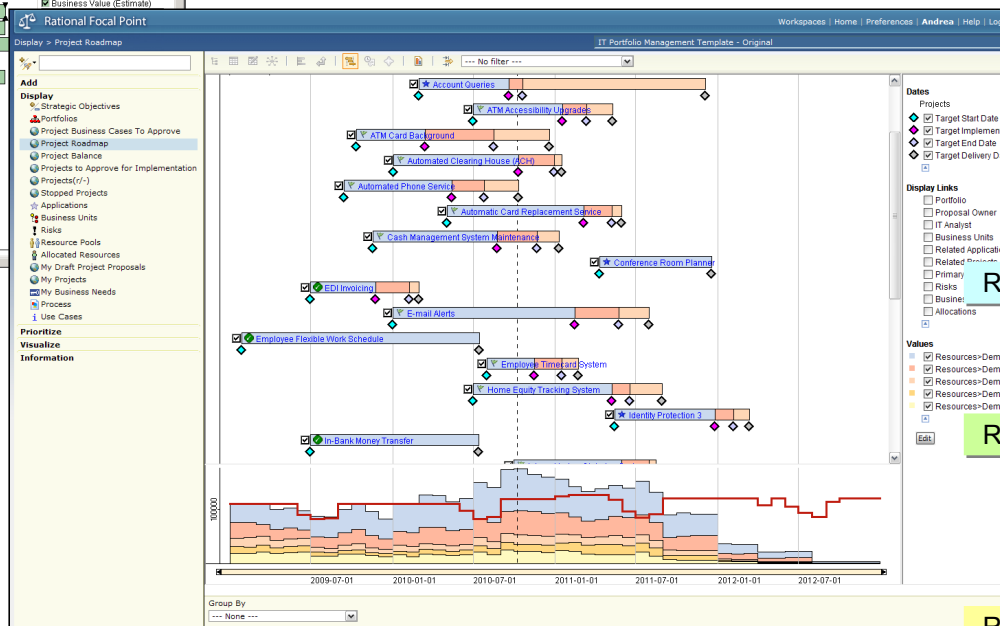
- Albert Einstein

Produce Resource Roadmap

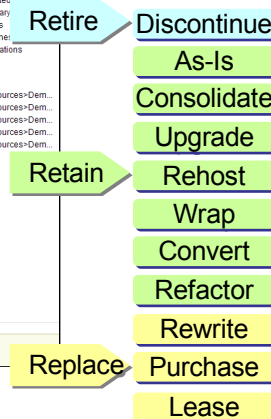
Weigh project priorities and stage project schedules



Trade-off between competing priorities



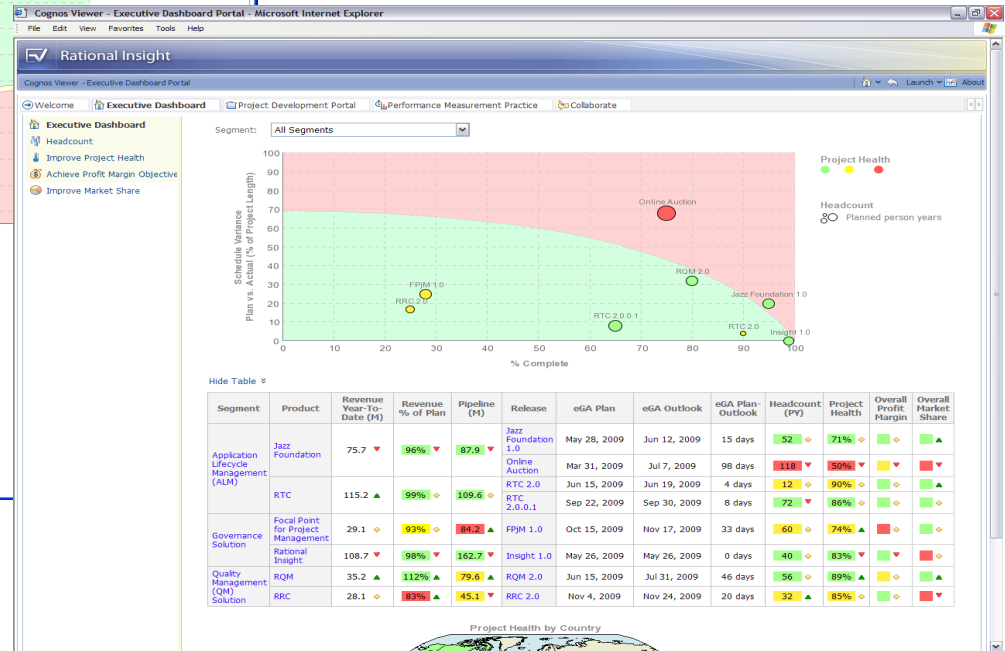
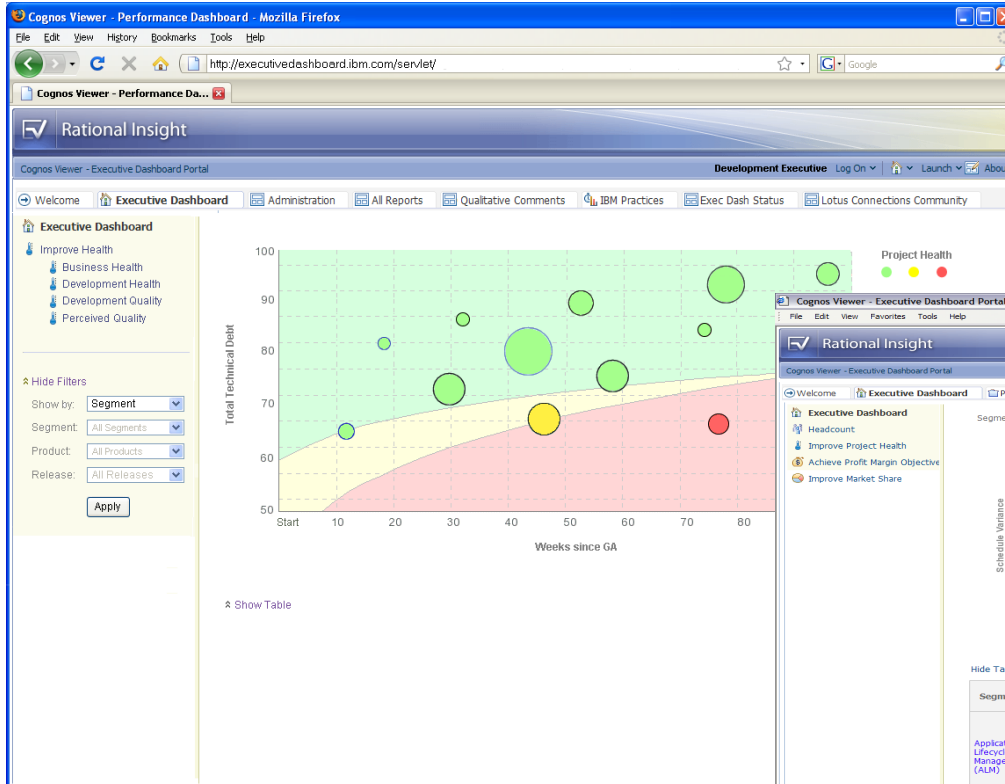
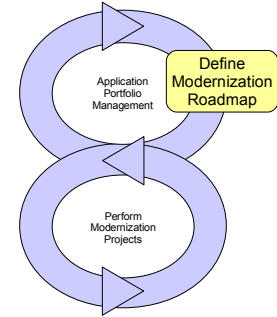
Macro-planning within resource demand and supply



Benefits:

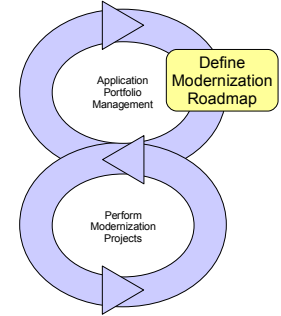
- ✓ Effective utilization of available resources (people, skills, monetary funds) using Focal Point
- ✓ Informed trade-offs between potentially competing priorities in a resource constrained environment using Focal Point
- ✓ Hardwire strategy to execution through Focal Point and Rational Team Concert integration

Govern your modernization through role-based dashboards



► Govern and manage to keep on track for objectives, budget and schedule

Define Modernization Roadmap



- Outcomes

- An ordered list of application renovation projects – and approaches to take
- Projects ordered by relevance and alignment to business goals
- An estimate of the time, resources, and return on investment for each project
- Define roadmap of which projects to do when, with consideration for resource supply constraints

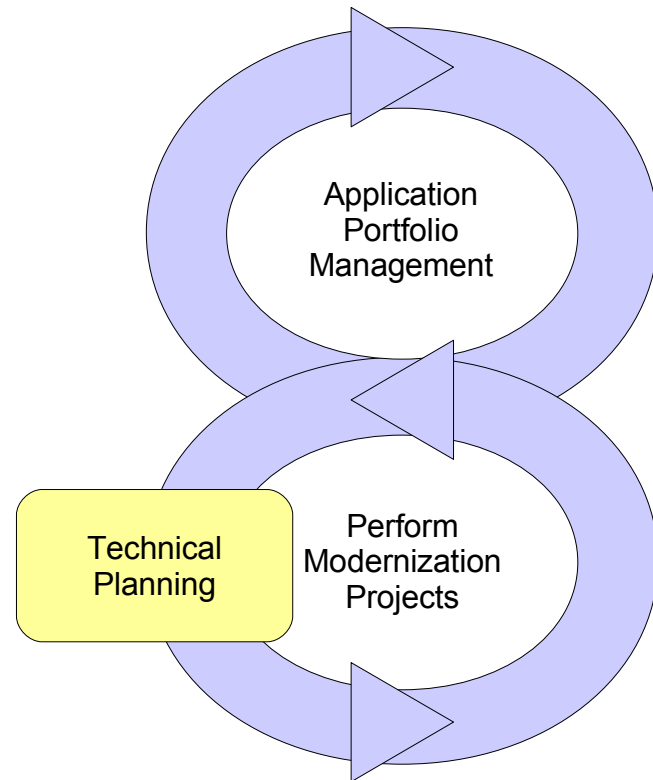
- Next Steps

- Allocate teams to work on the renovation projects
- Perform more detailed application analysis during the renovation
- Dispatch application renovation work projects

- And begin the Application Portfolio Management cycle again!

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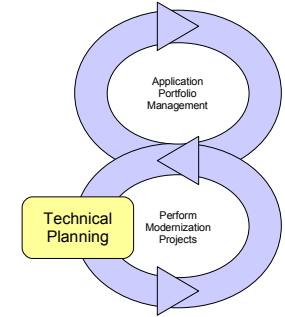


Technical Planning

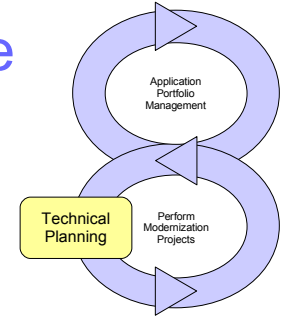
- This is where deep technical work starts
 - Any application renovation project requires program understanding
 - What modules do we need to update?
 - Which databases are affected, and how?
 - What impact will that have on the existing application source code?
- Goals
 - Understand the application's components and how they depend upon one another
 - Establish a detailed understanding of the application source code
 - Identify the specific areas of code and data that require modification
- Tasks
 - Ensure that the application source code is under change management
 - Analyze the application source code, database tables, and build environment
 - Analyze program flow and component diagrams to understand code structure
 - Plan the renovation project work tasks based on analyzing impact of required changes

"Here be dragons."

"The devil is in the details."



Application Analysis – high level view of source code base



Explore MVS assets

Actions ▼

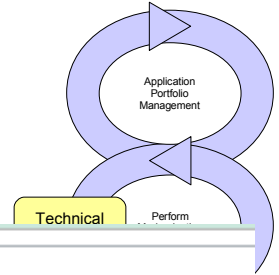
Search MVS asset names: Type mixed case [Advanced search](#)

Run time	Total
Batch job	57
CICS group	221
CICS online region	2
CICS transaction	938
DB2 system	5
IMS DBD	45
IMS subsystem	2
IMS transaction	50
Run unit ?	1317

Program	Total
BMS map definition	115
BMS map set definition	115
Concatenation set	16
DB2 stored procedure	215
Entry point	447
IMS PSB	104
Literal	19984
Program	456

Data	Total
Data element ?	158995
Data set	445
Data store	325
DB2 column	4889
DB2 table	541
DD name	1361
I/O record description	749

Inventory - lists – search-able summary for each type



Program summary

Actions

Overview **Statistics** e-business information

Search Program names: Type mi

Optionally, specify any additional search criteria from the following:

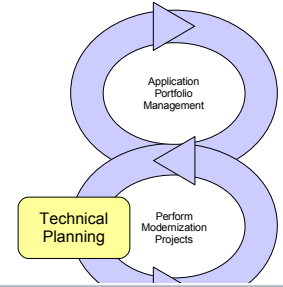
Site: Application: Annotations: Language: Analysis status: Program type:

[Assign new language](#), [Configure scanning options](#), [Queue selected](#)

<input type="checkbox"/>	Program (12)	Language	Analysis status	Action	Number of lines in program	Source location
<input type="checkbox"/>	QAD01	COB	Completed	delete , annotate	522	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD02	COB	Completed	delete , annotate	491	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD02	COB	Completed	delete , annotate	491	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD02A	COB	Completed	delete , annotate	498	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD03	PLI	Completed	delete , annotate	741	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD04	COB	Completed	delete , annotate	482	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD05	COB	Completed	delete , annotate	609	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD06	COB	Completed	delete , annotate	164	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD06	COB	Completed	delete , annotate	164	C:/Documents and Settings/Administrator/IBM/ratiou RaaI-Demo/sourceWextensions/DMHSRC19.cb
<input type="checkbox"/>	QAD07	COB	Completed	delete , annotate	337	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD08	COB	Completed	delete , annotate	179	C:/Program Files/IBM/Rational Asset Analyzer/samp
<input type="checkbox"/>	QAD09	COB	Completed	delete , annotate	269	C:/Program Files/IBM/Rational Asset Analyzer/samp

[Assign new language](#), [Configure scanning options](#), [Queue selected](#)

Inventory – linked details about each source element



Program details

Actions

Details	
File:	DMHSRC16
Program:	QAD02
Language/type:	COBOL / Program source
Scanning options - actual:	Proprietary scanner. Support any COBOL level. This is the most restrictive setting for reserved words.
Analysis status:	Completed
Metrics:	Blank lines: 53, Comment lines: 36, Noncomment lines: 309, Number of lines in file: 398, Number of lines in program: 491, Splitting nodes: 26
Site:	RAA
Container:	NTFS C:/Program Files/IBM/Rational Asset Analyzer/sample/source
Database updated:	2009/04/07 03:38:37 PM by DMHWSAA
Concatenation set assigned:	COBOL - DMH1

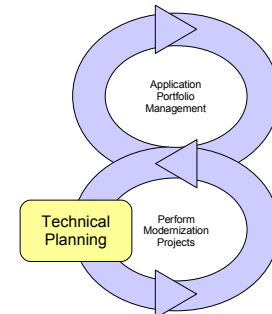
- Included files
- Batch jobs
- Control transfers
- DB2
- Data sets
- Data stores
- Entry points
- Run units
- Transactions
- User-related assets
- Annotation

Source files used by this program

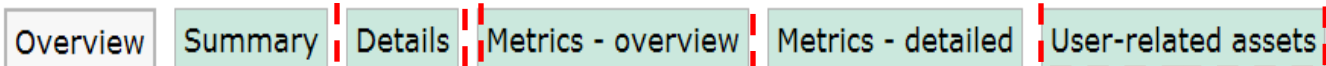
File (2)	Language	Type	Analysis status	Action	Number of lines in file	Source location
DMHSRC06	COBOL	Included source	Completed	annotate	37	C:/Program Files/IBM/Rational Asset Analyzer/sample/source/DMHSRC06
DMHSRC07	COBOL	Included source	Completed	annotate	19	C:/Program Files/IBM/Rational Asset Analyzer/sample/source/DMHSRC07

End to End Impact Analysis

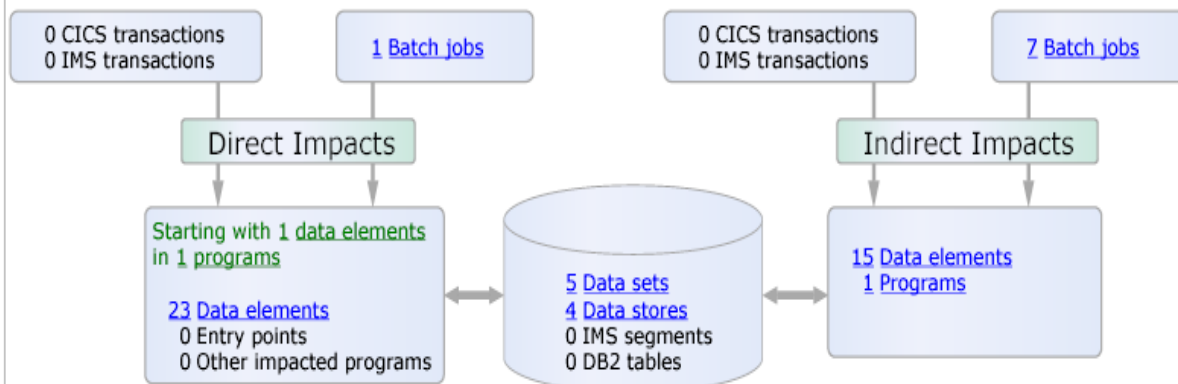
Understand change impact as part of planning



- Reduce time to determine **scope of change** whether for new enhancements, or even maintenance efforts
- View the metrics for impacted artifacts to determine the **risk of change** i.e. cyclomatic complexity, lines in file, etc.
- Traverse user-defined relationships to determine **impacts across platforms** i.e. follow dependencies from mainframe to J2EE and back.
- Create a “**bill of materials**” of impacted artifacts by evaluating the details page



The following impact analysis overview diagram shows a subset of assets that this proposed code change directly and indirectly affects.



Impact Analysis Overview

Define work items and tasks

The screenshot shows the Rational Team Concert Work Items interface. On the left is a tree view of team artifacts and queries. The main area displays a detailed view of a defect, including its summary, details, description, and discussion threads. At the bottom, a table lists query results for work items.

Predefined, custom and personal queries

Subscribe to work items you're interested in

Integrated discussion threads

Query results

Understands and persists work item's relationship to SCM and build artifacts

I	Status	P	S	Summary	Owned By	Created By
12	Resolved			UWS Add JavaDoc to CLI code	April Blues	Jerry Jazz
10	Resolved			Expose functionality via public get method to core temperature ...	Unassigned	Jerry Jazz

Plan work across team members

Understand how well you are progressing against your targets in real-time

The screenshot shows a project management dashboard for 'UWS Temperature Conversion M1 Plan'. The interface includes a team area with members like April Blues, Derek Holt, Jerry Jazz, Zach Builder, and Zara Intern, each with their own progress bars and task lists. A 'Group by' dropdown is set to 'Owner', and 'Sort By' is set to 'Priority'. A 'Progress' bar is visible at the top right. A 'Related Work Items' section is also present.

Team Member	Closed items	Open items	Progress	Estimated
April Blues	1	1	1 / 17 -15 h	100%
Derek Holt	0	2	0 / 8 -7 h	100%
Jerry Jazz	1	1	0 / 4 -3 h	100%
Zach Builder	2	2	25 / 37 -10 h	100%
Zara Intern	0	2	0 / 17 -16 h	100%
Unassigned	1	1	8 / 9 h	

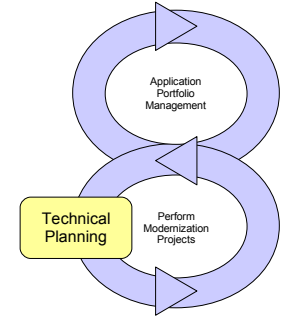
Task List for Unassigned:

- UWS Create the temperature conversion CLI package (2 days, Unassigned, 9)
- UWS Define permissions (4 hours, Unassigned, 5)
- UWS Define team members (4 hours, Unassigned, 6)
- UWS Create the core temperature conversion package (1 day, Unassigned, 7)
- UWS Define iterations/milestones (4 hours, Unassigned, 3)
- UWS Add JavaDoc to core temperature conversion JUnit tests (1 hour, Unassigned, 11)
- UWS Create the core temperature conversion package JUnit tests (2 days, Unassigned, 8)
- Expose functionality via public get method to core temperature conversion code (1 hour, High, 23)

Drag-and-drop work items to change owners/create child parent relationships

Plan and execute iterations while managing team and individual load

Technical Planning



- Outcomes

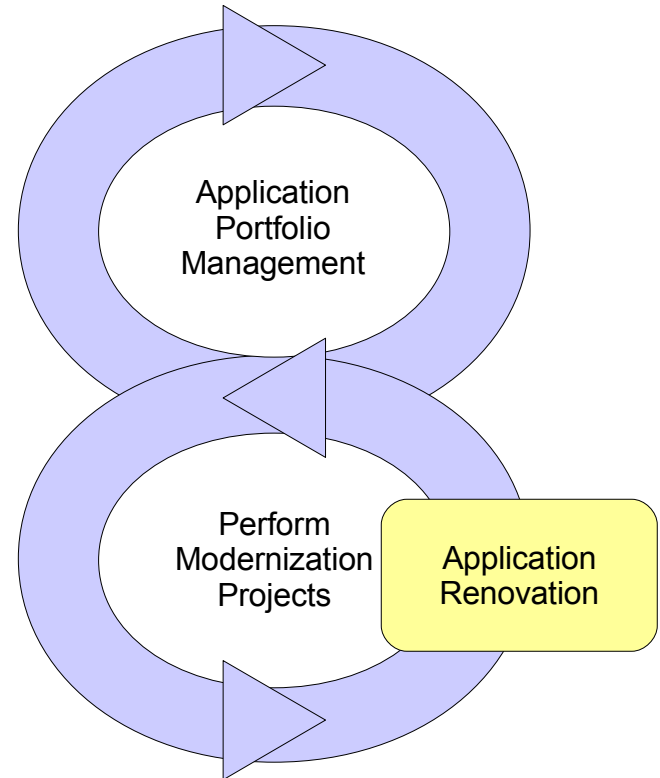
- A plan, including assigned work items, for the renovation work project
- A detailed understanding of the affected pieces of the application
- A referable information resource to help application development teams
- An automated, repeatable, build environment for building the application

- Next Steps

- Begin making changes to the application according to the work items and plan
- Unit, function, and system test the changes
- Reflect application information back into the application portfolio management system

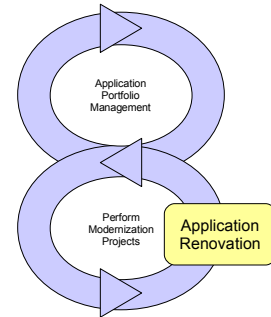
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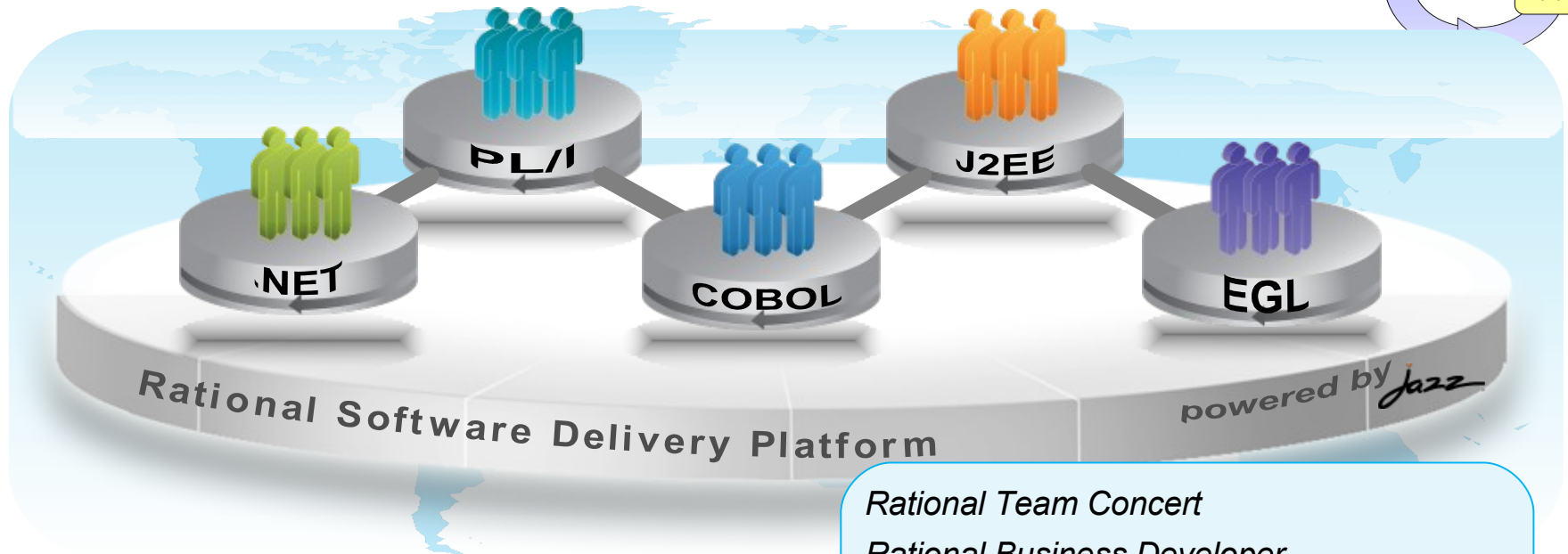
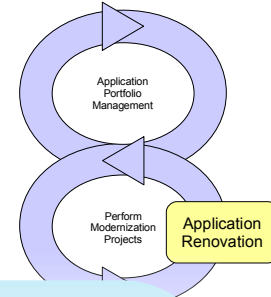
Application Renovation

- Each renovation project will take on different characteristics
 - Source code change
 - Database changes
 - Deployment platform and build modifications
 - Coordinated testing of the modified application
 - Staged deployment into production environments
- Goals
 - Successfully complete the required changes to the application
 - Ensure a smooth and efficient quality assurance phase
 - Deploy the renovated application into the production environment
- Tasks
 - Make changes to application source code and data designs
 - Test these changes in a local development environment
 - Collect changes made by multiple team members for consolidated build
 - Test and QA the combined set of changes
 - Plan and implement a staged deployment of the renovated application



Collaborative Application Lifecycle Management

Deploy new, common team infrastructure to manage modernization projects

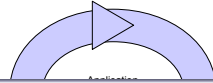


- Rational Team Concert*
- Rational Business Developer*
- Rational Developer for zEnterprise*
- Rational Developer for System z / UT*
- Rational Asset Analyzer*

Benefits

- ✓ Improved communication, higher quality, informed decision making, and more automated, transparent, and predictable software development
- ✓ Support for re-platforming, UI modernization, conversion, refactoring, and rewriting

Integrated Development Environments



The screenshot displays the IBM Rational Developer for System z IDE interface. The main window shows a COBOL program named COBDATE.cbl with the following code:

```

Line 16      Column 1      Insert
-----*A-1-B-----2-----3-----4-----5-----6-----
WORKING-STORAGE SECTION.
01  ChrDate.
   05  ChrDate-Length      pic s9(4) comp value 10.
   05  ChrDate-String      pic x(10) .
01  PicStr.
   05  PicStr-Length       pic s9(4) comp.
   05  PicStr-String       pic x(80) .
77  Lillian                pic s9(9) comp.
77  Formatted-Date         pic x(80) .

PROCEDURE DIVISION.
*
MAIN-LOGIC.
  DISPLAY "Starting COBDATE".
  DISPLAY "-----"
  ACCEPT ChrDate-String from DATE.
    
```

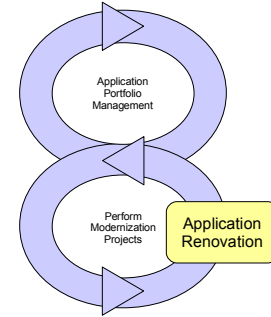
The interface includes a Project Explorer on the left showing a project structure with folders like 'BeerBottles' and 'COBOL-LE-DateTime [stplex4b]'. A Properties/Outline pane at the bottom left shows the program structure for COBDATE, including sections like IDENTIFICATION, ENVIRONMENT, CONFIGURATION, DATA, and PROCEDURE DIVISION.

At the bottom, the Remote Error List pane shows a search for '*0C4*' with the following results:

Explanation	Results
0C4	Explanation: A program interruption occurred, but no routine had been specified to handle this type of interruption. Refer to the instruction description in Principles of Operation to find out how the instruction stops processing for the error condition.

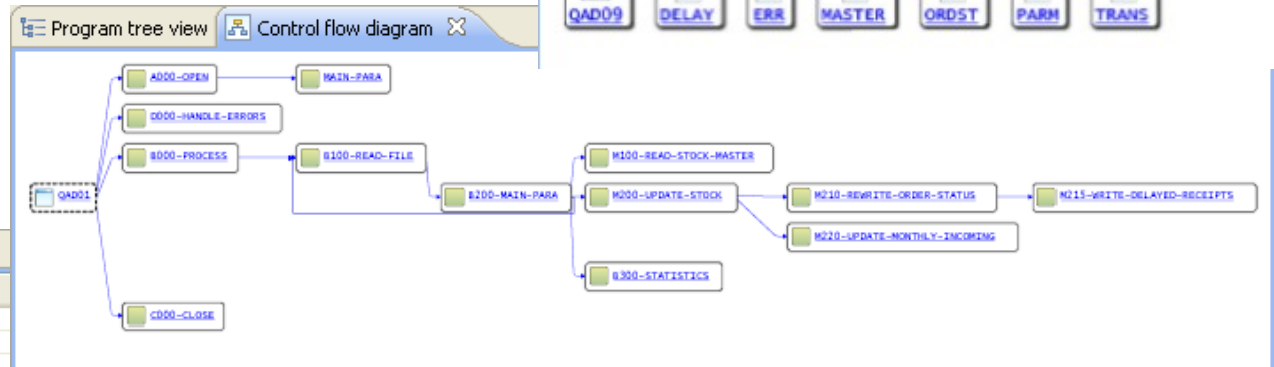
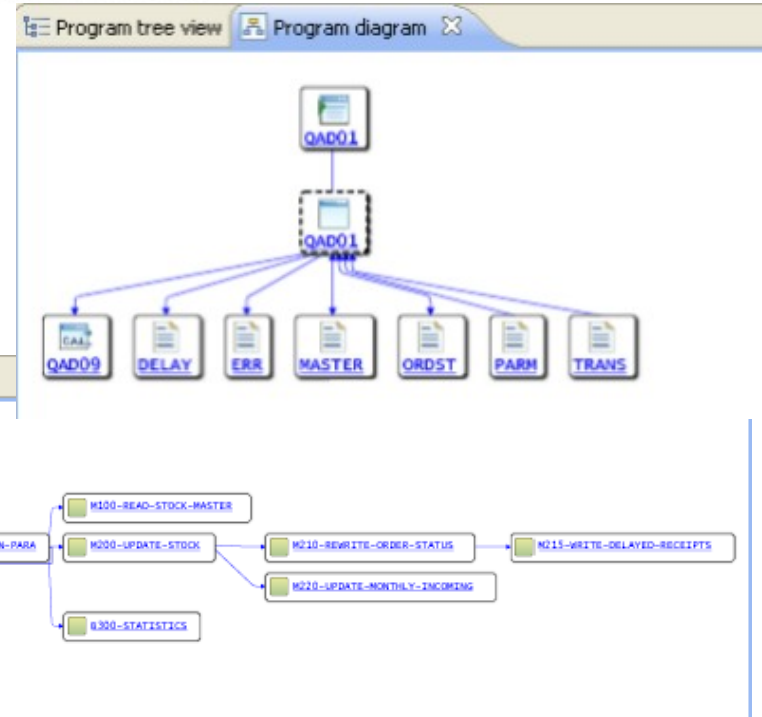
Analyze applications using graphical diagrams

- Bring application analysis information into the IDE to aid in program development and understanding
 - ▶ Link code to data and runtime resources
 - ▶ Visualize code structure and flow
- Understand the effect of changes made in the IDE when deployed into production
 - ▶ Run impact analysis on code changes to determine effected production modules
 - ▶ Size testing efforts and create workspaces for changes



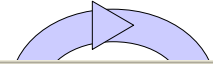
The screenshot shows a window titled 'Impact analysis results' with a sub-tab 'Impact Analysis (Data element: MASTER-FILE)'. It contains a tree view with the following items:

- Impacted programs
 - QAD01
- Impacted data elements
- Impacted files
- Impacted data stores



Name	Level	Type
DELAY-FILE	0	FD
DELAY-STA		UNKN
ERROR-DAT		NUMB
ERROR-DES		CHAR
ERROR-FIL		FD
ERROR-REC		GRP
ERROR-STA		UNKN
FILLER		CHAR
INP-DELAY-RCPT-REC	1	GRP
INP-DRCPT-EXPECTED-DT	5	CHAR
IMP-DRCPT-DAT-MO	5	CHAR

Interactive test of database queries



The screenshot displays the IBM Data Studio interface with four main components:

- Left Panel (cursravg.cbl):** A COBOL program listing. A section of code is highlighted in blue, showing a cursor declaration and a SQL statement:


```
EXEC SQL
  DECLARE C1 CURSOR FOR
  SELECT DEPT, MIN(PERF), MAX(PERF), AVG(PERF),
         MIN(HOURS), MAX(HOURS), AVG(HOURS)
  FROM EMPL, PAY
  WHERE EMPL.NBR = PAY.NBR
  GROUP BY DEPT
END-EXEC.
```
- Middle Panel (*Script1.sql):** A SQL script window containing the following query:


```
1 SELECT DEPT,
2 MIN(PERF), MAX(PERF), AVG(PERF),
3 MIN(HOURS), MAX(HOURS), AVG(HOURS)
4 FROM EMPL, PAY
5 WHERE EMPL.NBR = PAY.NBR
6 GROUP BY DEPT
```
- Right Panel (EMPL):** A table editor showing a table with columns NBR, LNAME, and FNAME. A context menu is open over the table, with the 'Insert Row' option selected.

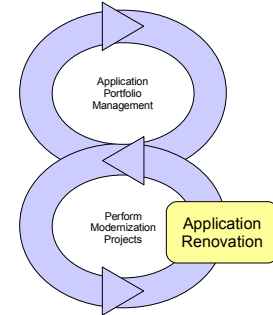
NBR [CHAR(2)]	LNAME [CHAR(10)]	FNAME [CHAR(8)]
01	LOWE	ROB
02	SHIELD	BROOKE
03	MOORE	ROGER
04	EASTWOOD	Ron
05	Lim	ZERO
06	BURNS	GEORGE
07	O'NEIL	RYAN
08	MARVIN	Vijay
09	LANCASTER	Leo
10	BLAIR	LINDA
- Bottom Panel (SQL Results):** A table showing the results of the SQL query. The first row has a warning icon.

Status	Operation	Date	DEPT	2	3	4	5	6	7
Warning	SELECT DEPT, MIN(PERF), MAX(PERF), AVG(PERF), MIN(HOURS), MAX(...)	10/24/09	1 ACC	2	3	2	15.99	26.75	21.3700
			2 FIN	2	4	3	8.89	32.45	22.6966
			3 MKT	1	3	1	6.11	32.41	17.2500
			4 R&D	1	1	1	43.59	43.59	43.5900
			5 NULL	NULL	NULL	NULL	67.82	67.82	67.8200

Use Case – Database Applications:

1. Copy/Paste your SQL Declare into a SQL Script and run it – verify results
2. Without doing any other navigation open a test table, and edit row values – or modify the statement (or both)
3. Re-run the SQL Script – verify results
4. Return to step 2 – repeat until satisfied with functionality

Application Renovation



- Outcomes

- Successful changes made to applications
- Deployed into production environments
- With measurable improvements to the business

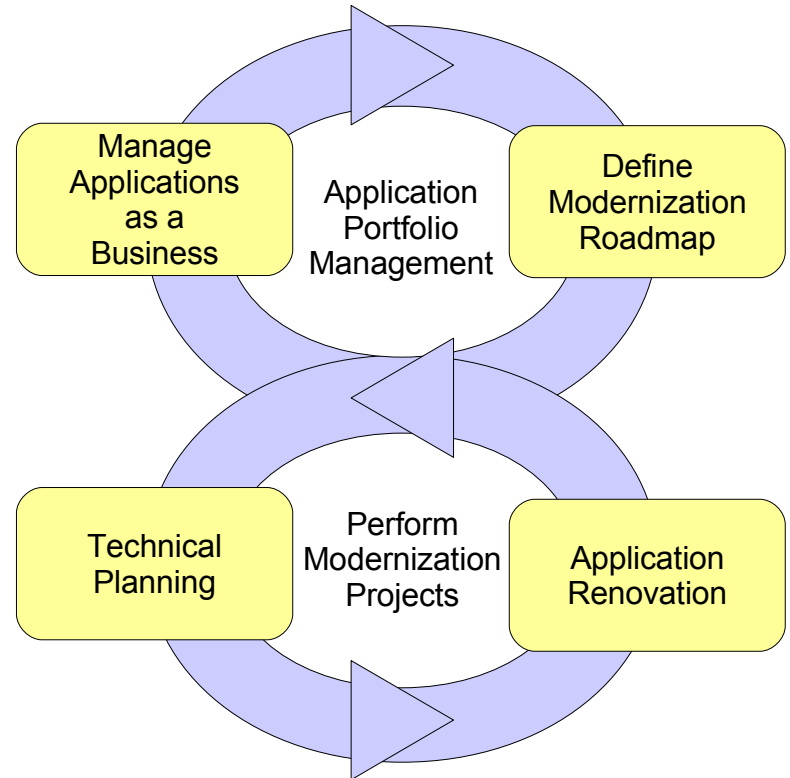
- Next Steps

- Reflect information learned back into Application Portfolio Management tools
- Measure savings and benefits of the application renovation project
- Compare measurements to forecasts for use in determining future estimates

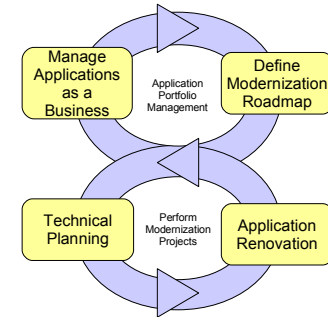
- And start the next renovation project suggested by the Application Modernization Roadmap!

Agenda

- Application Modernization – what is it?
- Manage Applications as a Business
- Define Modernization Roadmap
- Technical Planning
- Application Renovation
- Summary



Summary



- Many companies spend more than 70% on keeping lights on, and that amount is increasing
- IT organizations have problems modifying applications at speed of business
- We provide a structured approach to incrementally modernize your portfolio based on business priorities
- Change without a plan is chaos
- A Plan without change is stagnation
- Business goals change
 - applications need to change to address them
- Continual renewal is required
 - tools help to guide, govern, drive, and accomplish this change



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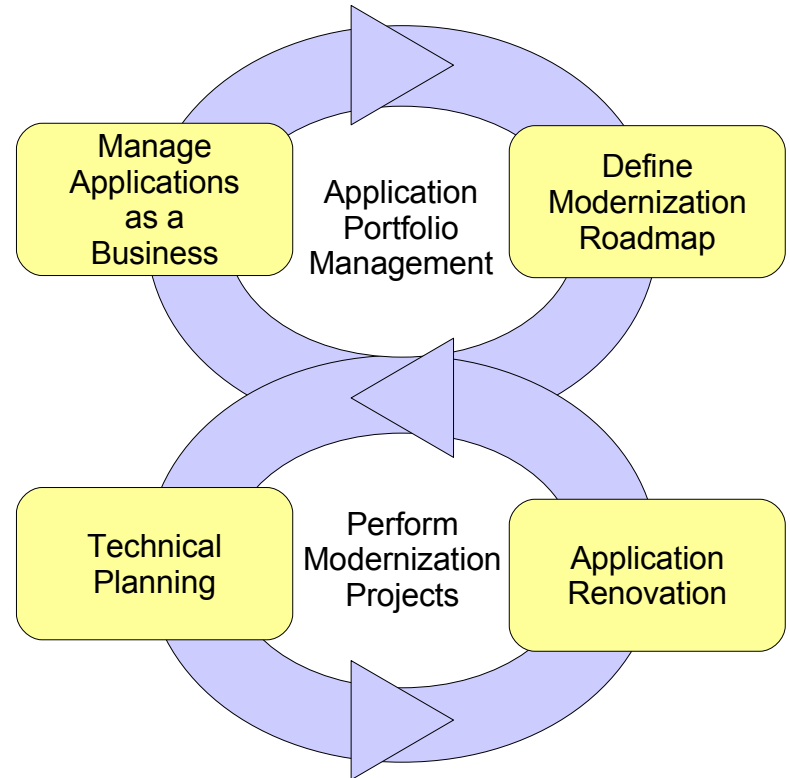
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Useful Links

- Rational System Architect
 - <http://www.ibm.com/software/awdtools/systemarchitect/>
- Rational Focal Point
 - <http://www.ibm.com/software/awdtools/focalpoint/>
- Rational Insight
 - <http://www.ibm.com/software/rational/products/insight/>
- Rational Team Concert Information:
 - <http://www.ibm.com/software/rational/products/rtc/>
- Rational Asset Analyzer Information
 - <http://www.ibm.com/software/rational/products/raa/>
- Rational Developer for zEnterprise Information:
 - <http://www.ibm.com/software/rational/products/developer/zenterprise/>
- Jazz Team Blog:
 - <http://jazz.net/blog/>
- My information
 - email: hahnt@us.ibm.com
 - Blog: <https://www.ibm.com/developerworks/mydeveloperworks/blogs/applicationmodernization>

Agenda

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Template content

