



Moving From Personal Spreadsheets To Enterprise Solutions

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Personal Spreadsheets To Enterprise Solutions

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by The Edge Software Consultancy Ltd.

Moving From Personal Spreadsheets To Enterprise Solutions

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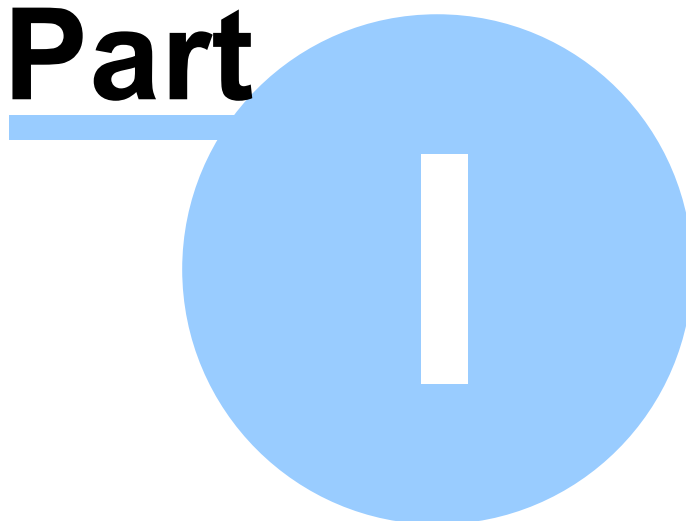
Consultancy Team

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Part



1 Introduction

1.1 Abstract

In this case study we present a successful implementation of an expense, leave and absence tracking system using The Edge's spreadsheet technology Morphit. We review the business requirements and implementation details, and illustrate the main use cases, discussing the knowledge gained and planned improvements.

Adopting structured data techniques overcame many of the problems of isolated spreadsheet documents such as managing spreadsheet change, centralizing master data and scaling to a multi-user environment. Data was pooled and analysed from multiple spreadsheet instances in real-time management reports.

1.2 Background

The Edge Software Consultancy ("The Edge") is a leading provider of scientific software used by pharmaceutical companies to organise and capture research data. The same technology has been designed for both scientific environments and general business usage. In order to validate these design objectives and to deliver real business benefits The Edge has applied this technology to solve a number of internal administration tasks. These include [expense tracking and payment](#); [leave requests and approval](#); and [recording of employee absence](#).

1.3 General Business Requirements

A number of general requirements were identified:

- **Accessibility** - The system must be accessible to both on-site and remote employees.
- **User Authentication** - Access must be limited to only Edge employees
- **User Authorisation** - Access to data and functionality must be restricted according to the user's business function.
- **Scalability** - The system must support at least 100 users and have a concurrency of 20 users running data intensive operations.
- **COTS** - In order to minimise the total cost of ownership, the system should be based on commercial off the shelf software and not require any customisation.

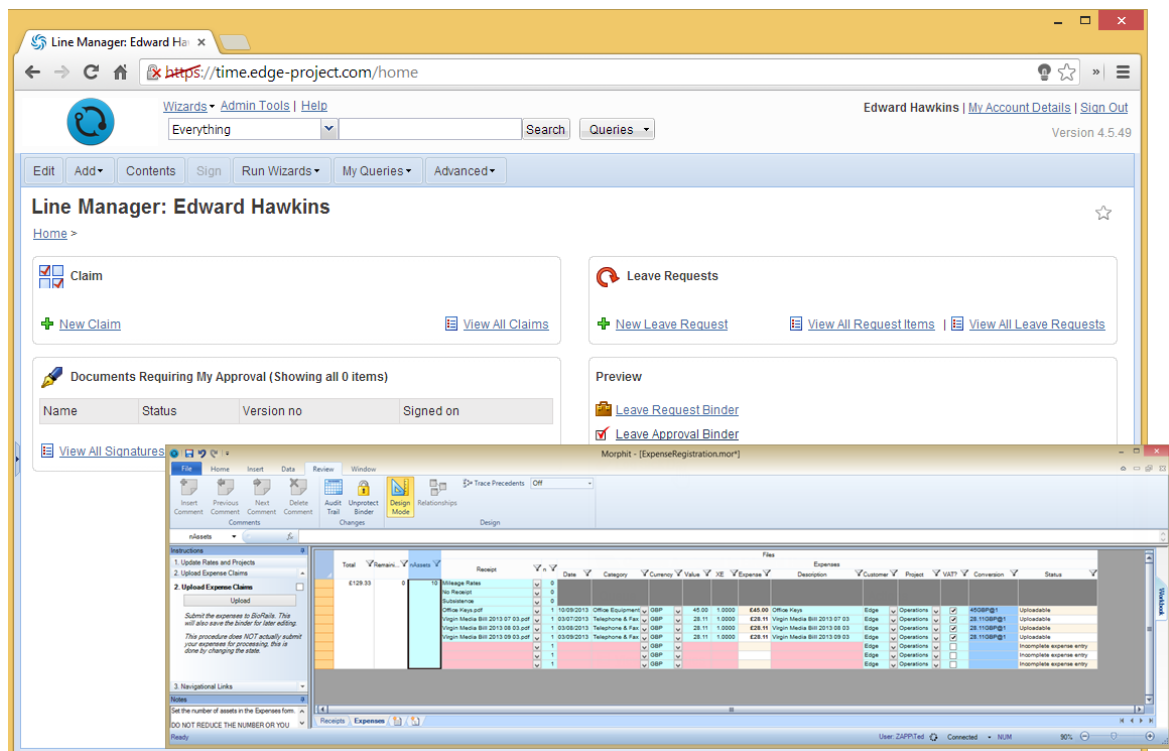
1.4 Software Components

This solution used Morphit to support complex business operations and Morphit Enterprise to provide content management and a reporting framework.

Morphit is a spreadsheet technology created and owned by The Edge. It helps to reduce error rates and improve spreadsheet validation through the use of field level formulae and a more formalized mechanism of creating spreadsheet models (see [Introducing Morphit, a new type of spreadsheet technology](#), Hawkins, Lemon & Gibson, Proc. European Spreadsheet Risks Int. Grp. (EuSpRIG) 2013).

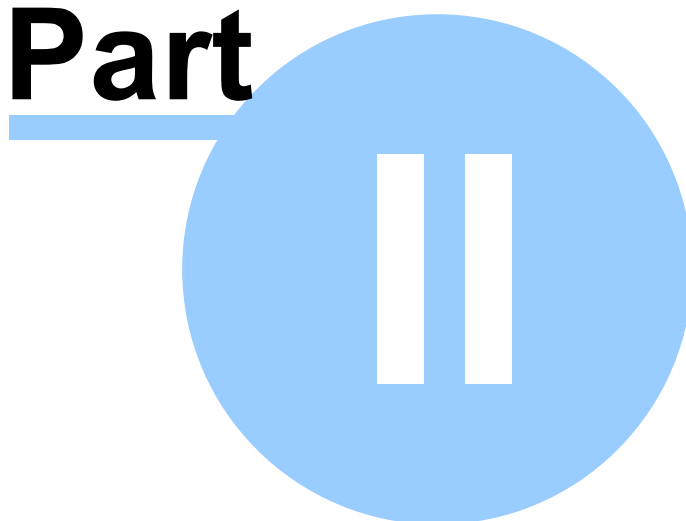
Morphit Enterprise is a web based system used to version control and deploy Morphit binders

and other documents. It enables the capture of structured data and facilitates reporting across spreadsheet instances in an enterprise environment. This includes support for requesting business processes, tracking delivery and recording of data.



Solution components

Part



2 Implementation

These topics describe the specific requirements and implementation for [expense](#), [leave](#) and [sick day](#) tracking.

2.1 Expense Tracking

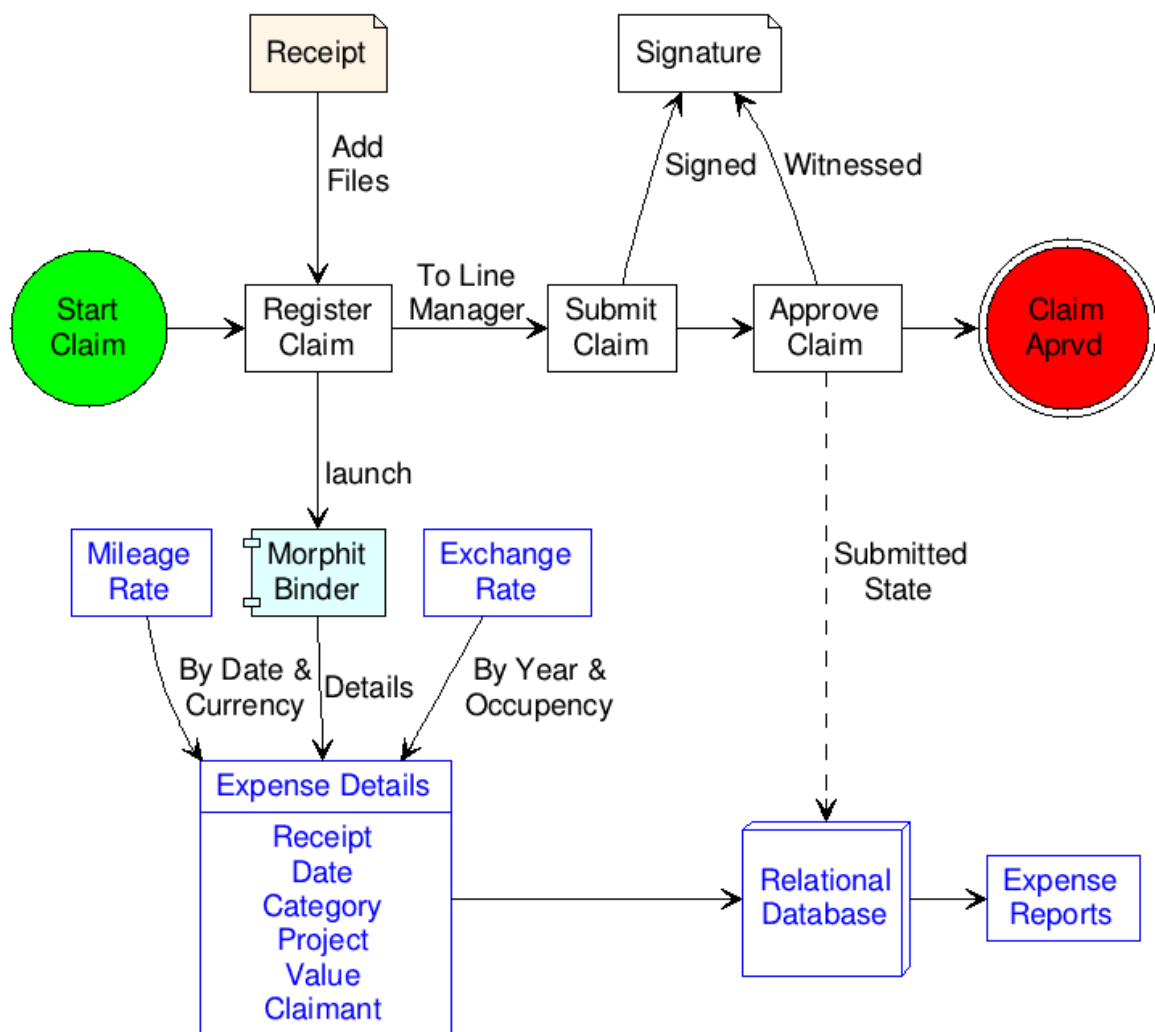
Company growth demanded a more scalable and enterprise solution to expense tracking than the existing document-based system. The objectives were to reduce the time taken to enter and process expense claims; minimise data entry errors; and provide project level reporting.

2.1.1 Requirements

1. **Compliance** - The software must comply with company expense policy.
2. **Submission** - Employees must be able to efficiently submit expenses.
3. **Approval work flow** - Claims must be approved before payment.
4. **Notification** - Users should be notified of any changes to the status of their claims.
5. **Content Management** - The system must support the storage and control of scanned receipts.
6. **Exchange Rates** - Expenses in multiple currencies must be converted to GBP (Great British Pounds).
7. **Mileage Rates** - Mileage claims must conform to HMRC (Her Majesty's Revenue and Customs) mileage rates.
8. **Archiving** - The system must support archiving in a long term storage format (PDF).
9. **Project Invoicing** - Project expense reports must be provided to improve invoicing efficiency.
10. **Searching** - Must be able to search for expenses by category, date, claimant, project and status.

2.1.2 Implementation Overview

A claim is created by the employee and is used to store scanned receipts. A Morphit binder is used to register the details of the expenses matching the receipts. This binder uses centrally managed information, such as exchange and mileage rates, to calculate expenses and collect other meta data. When the binder is saved, the information is uploaded to the claim. The user then submits the claim to their line manager. This action initiates an electronic signature event that protects the data as a legal record. After checking the details the line manager counter signs the claim, making it available for expense processing by finance personnel. The claim can be outputted to PDF as a defensible document for long term storage.



Expense submission and approval workflow

2.1.3 Tasks

A number of new data objects were necessary to support the business requirements. These are defined as data storage templates in Morphit Enterprise. The data described in these templates is typed as numeric, text, date and lists of values (dictionaries). Tasks are then created from these templates in order to store data for subsequent analysis. Content such as text, images and other files can be attached to a task. Additional task metadata is automatically captured such as audit dates and the creator.

Each of the required templates are described below.

2.1.4 Claim Template

When employees make a claim the data object captures the following data:

- Date (Date)
- Expense (Decimal) - GBP
- Conversion (Decimal) - from local currency
- Description (Text)

- Category (Dictionary)
- Customer (Dictionary)
- Project (Dictionary)
- Receipt (File)
- Filename (Text)

Claim: thawkins_2013_11_06-0020 (Read Only) - paid

Home > Edward Hawkins > 201311

thawkins_2013_11_06-0020

Create the claim, add the files then open Morphit to document the files

Required fields *

expense	Receipt *	Filename *	Date *	Expense *	Description *	Category *	Conversion	Customer	Project *
root									
expense_1	/assets/file/1053	Virgin_media 20131121.pdf	2013-10-21	28.11	Virgin media bill	Broadband	28.11GBP@1	Edge	Operations
expense_2		Mileage Rates	2013-10-22	53	Onsite reporting day with Bob	Mileage2	106@ £0.5/mile		DMPK
expense_3	/assets/file/1052	Flu Jab 9.99.pdf	2013-10-30	9.99	Fluu jab	Miscellaneous Expenses	9.99GBP@1	Edge	Operations

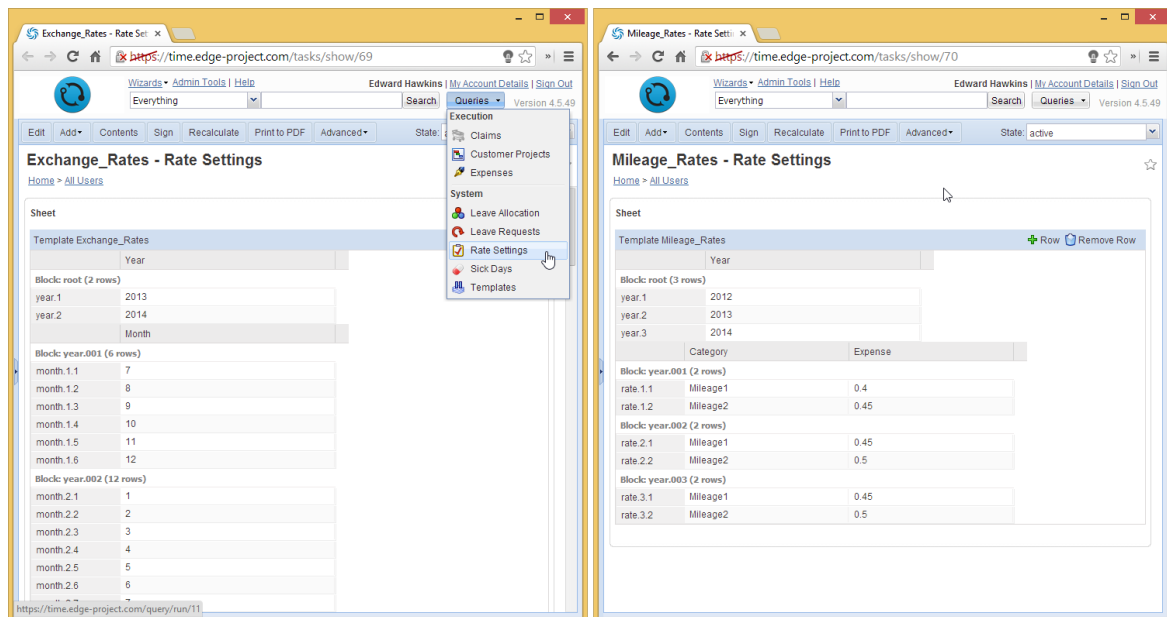
Instructions

1. Processing
 1. Add your receipt files (jpg, png, pdf) to this folder
 2. Open the Morphit binder below using the link
 3. Expenses are registered against the valid files that have been added to the folder
 4. Upload the expenses in Morphit and the Binder can be closed

A claim detailing expenses

2.1.5 Supporting Tasks

Tasks can also be used to store data which is applied across claims, such as exchange and mileage rates. These tasks can only be updated by those with administration rights.



Supporting tasks for the storage of exchange and mileage rates

2.1.5.1 Exchange Rates Template

Monthly exchange rates are stored with the following data:

- Year (Integer)
- Month (Integer)
- Currency (Dictionary)
- Exchange Rate (Decimal)

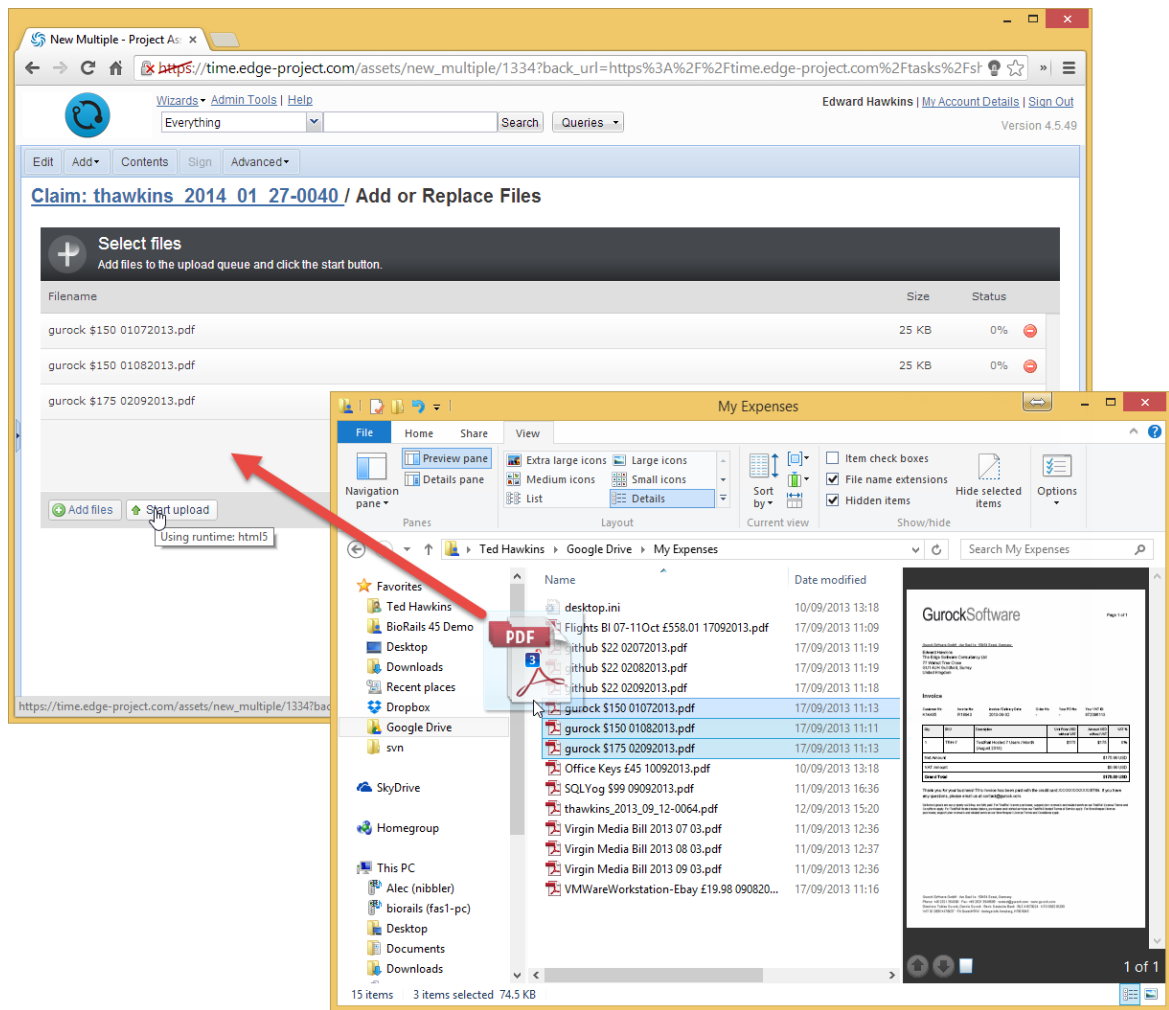
2.1.5.2 Mileage Rates Template

Mileage rates are set annually according to the rules set by HMRC:

- Year (Integer)
- Mileage1 (Decimal) - Single occupancy rate
- Mileage2 (Decimal) - multiple occupancy rate

2.1.6 File Management

Receipts are scanned as images or PDF files and attached to the claim. These are handled as version controlled content.



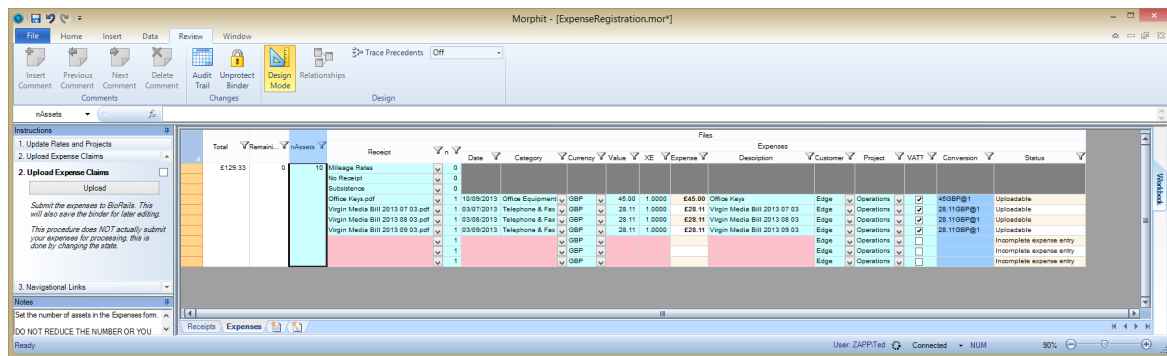
Attaching receipts to a claim

2.1.7 Expense Registration

The entry of expenses was streamlined using a Morphit binder in which the user enters one or more expenses for each receipt, adding the following information:

- Date
- Category
- Currency
- Value
- Description

The Morphit binder calculates the actual expenditure in GBP using current exchange and mileage rates. When the binder is saved details of the claim are stored in the Morphit Enterprise database.



Entering expense details

2.1.8 Submission

When the claim is complete the user signs it and submits it to their line manager, who then receives an email notification. The line manager reviews and counter-signs the claim, making it read-only and ready for payment.

Sign Folder - Claim: thawkins_2013_09_11-0056

Signature

Required fields *

Folder: thawkins_2013_09_11-0056

State Changes: From pending to submitted

Confirm Password for Edward Hawkins (thawkins) *:

Comment *: Virgin media expenses and key cutting

Witness *: (Administration) Andrew Lemon

Sign Abandon Cancel

(Administration) Alec Gibson
(Administration) Andrew Lemon
(Administration) Ginette Stead
(Administration) Robert Shell
(Administration) System Administrator

Preview Document

thawkins_2013_09_11-0056

Create the claim, add the files then open Morpht to document the files

Required fields *

expense	Receipt *	Filename *	Date *	Expense *	Description *	Category *
root						
expense.1	/assets/file/749	Office Keys.pdf	2013-09-10	45	Office Keys	Office Equipment
expense.2	/assets/file/750	Virgin Media Bill 2013 07 03.pdf	2013-07-03	28.11	Virgin Media Bill 2013 07 03	Telephone & Fax
expense.3	/assets/file/747	Virgin Media Bill 2013 08 03.pdf	2013-08-03	28.11	Virgin Media Bill 2013 08 03	Telephone & Fax
expense.4	/assets/file/748	Virgin Media Bill 2013 09 03.pdf	2013-09-03	28.11	Virgin Media Bill 2013 09 03	Telephone & Fax

Signing a claim

2.1.9 Payment

Every month, finance personnel will take a report of submitted claims and review them, and if they deem them valid make payment. Each claim is printed to a PDF, which is stored in the long term archive. The claim is marked as paid.

2.1.10 Expense Reporting

Details of all claims and expenses can be searched and reported on.

The screenshot shows the 'Claims' report in the EdgeSpense application. The interface includes a navigation menu with 'Claims' selected, a search bar, and a table of claims. The table has columns for Claim, State, Created, and Description. The data shows five rows of claims, all with a 'paid' state and a 'Create the claim, add the files then open Morphit to...' description.

Claim	State	Created	Description
thawkins_2014_01_27-0040	pending	2014-Jan-27 09:17:04	Create the claim, add the files then open Morphit to...
thawkins_2014_01_07-0032	paid	2014-Jan-07 09:32:36	Create the claim, add the files then open Morphit to...
thawkins_2013_11_06-0020	paid	2013-Nov-06 09:48:08	Create the claim, add the files then open Morphit to...
thawkins_2013_10_14-0004	paid	2013-Oct-14 10:53:35	Create the claim, add the files then open Morphit to...
thawkins_2013_09_17-0001	paid	2013-Sep-17 10:24:57	Create the claim, add the files then open Morphit to...

Claims report

The screenshot shows the 'Expenses' report in the EdgeSpense application. The interface includes a navigation menu with 'Expenses' selected, a search bar, and a table of expenses. The table has columns for Claim, Claimant, Date of Expense, Category, and Description. The data shows five rows of expenses, all with a 'Test rails' category and a 'Website cost...' description.

Claim	Claimant	Date of Expense	Category	Description
thawkins_2013_09_17-0001	Edward Hawkins	2013-09-02	Computer Sof...	tes
thawkins_2013_09_17-0001	Edward Hawkins	2013-08-01	Computer Sof...	tes
thawkins_2013_10_14-0004	Edward Hawkins	2013-10-01	Website cost...	tes
thawkins_2014_01_07-0032	Edward Hawkins	2014-01-01	Website cost...	Test rails
thawkins_2014_01_07-0032	Edward Hawkins	2013-12-02	Website cost...	Test rails

Expense report

2.2.2.2 Approving Leave

The line manager receives by email a daily summary of leave requests. A Morphit binder is used to review all pending leave requests and approve or reject them. The employee receives an email notification of the decision.

2.2.3 Requests and Queues

In order to meet the business requirements the solution uses the requesting features of Morphit Enterprise. Requests consist of a list of items (employees) and a business process (leave request). The person providing the business process being requested manages a queue of requests processing the items.

2.2.4 Supporting Templates

The leave system relies on a number of centrally maintained tasks which hold data for UK bank holidays and employee annual leave allocations. These can only be updated by those with administrator rights.

2.2.4.1 UK Bank Holidays Templates

UK bank holidays are stored with the following data:

- Year (Integer)
- Date (Date)
- Description (Text)

2.2.4.2 Annual Leave Allocation Templates

Employee annual leave allocations are stored with the following data, which is confidential information and can only be seen by the relevant employee -

- Year (Integer)
- Who (Dictionary)
- Leave_Duration (Integer)

2.2.5 Leave Request

The employee logs onto Morphit Enterprise and launches the 'Leave Request Binder', which is automatically updated with details of their holiday allocation and the status of their previous requests.

The employee enters the start and end dates of their leave, and the binder then calculates for them the number of days actually required, taking into account working days and bank holidays. They are instantly provided with a total of approved, pending and available days for the current calendar year and prompted for a reason for the leave.

When the 'Submit' button is pressed the information is submitted to a 'Leave Queue'. An email notification is sent to their line manager informing them that there are new requests to approve.

Morphit - [Request Submission.mor*]

File Home Insert Data Review Window

Clipboard Copy Paste From Excel Paste
Font Arial 8.25 B I U
Alignment Merge
Number Knock Out
Styles New Rule Manage Rules
Rows Insert After Insert Before Add Child Group
Editing Replace Clear Filters Find Fill Series Data Entry By Form Clear Convert To Values

Instructions

1. Set Request Details

[Request](#)

Set the year and start and end dates.

Duration is calculated from the number of workdays in the date range but does not include bank holidays so it may be an over-estimate. Please correct if necessary.

2. Submit Request

Notes

Who	Edward Hawkins
Manager	Alec Gibson
Year	2014
StartDate	26/05/2014
EndDate	30/05/2014
Requested Days	4
Approved Days	2
Pending Days	0
Available Days	33
Reason	Camping holiday at half term
Requestable	Yes
Summary	Leave will be requested from 26-May to 30-May, 2014 and be approved by Alec Gibson

Friday, May 30 2014

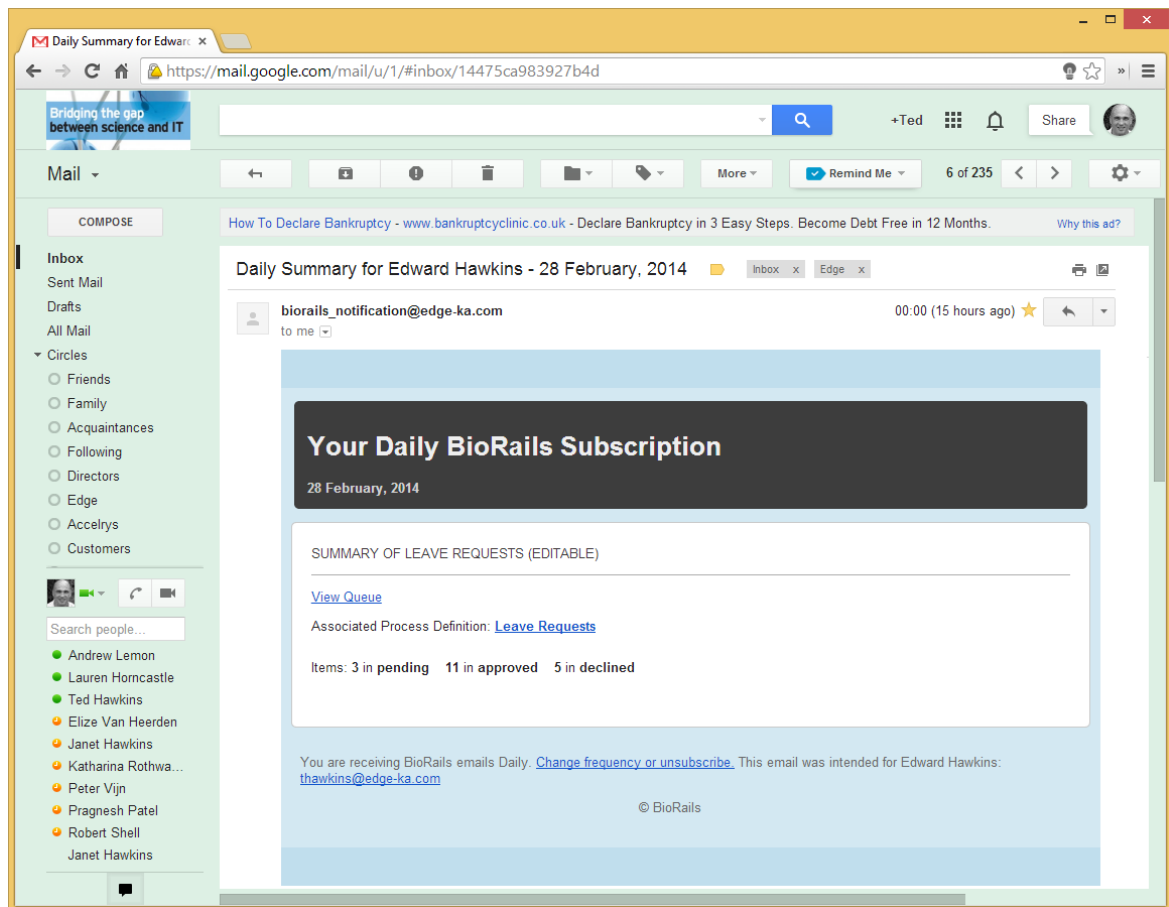
Mon	Tue	Wed	Thu	Fri	Sat	Sun
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

OK Today Cancel

Ready User: ZAPPTed Connected NUM 140%

Navigation: Landing Page Request For Leave My Previous Requests My Leave Allocation Calendar Leave Requester

Morphit helps the requester request leave by providing up to date information at point of need and automatically takes into account weekends and bank holidays

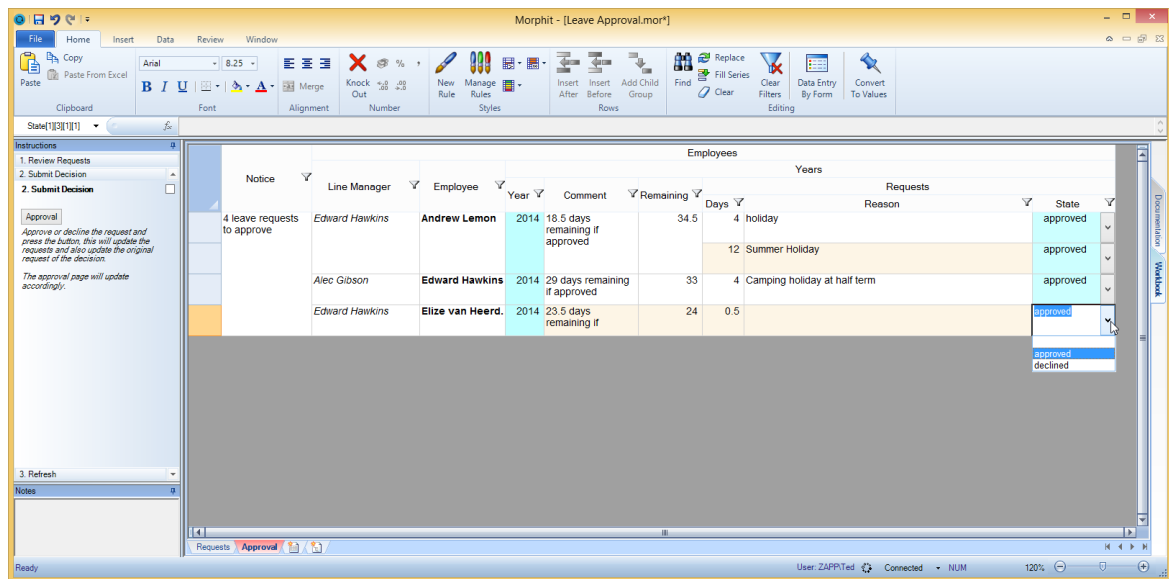


The line manager then launches the 'Leave Approval Binder', which is automatically updated with all the pending leave requests. The binder then calculates the remaining leave days currently available for each employee and the projected number of days they have remaining if the requests are approved. The line manager can approve or reject the leave request and the system will send an email to the employee informing them of the decision.

2.2.6 Approval

The line manager then launches the 'Leave Approval Binder', which is automatically updated with all the pending leave requests. The binder then calculates the remaining leave days currently available for each employee and the projected number of days they have remaining if the requests are approved.

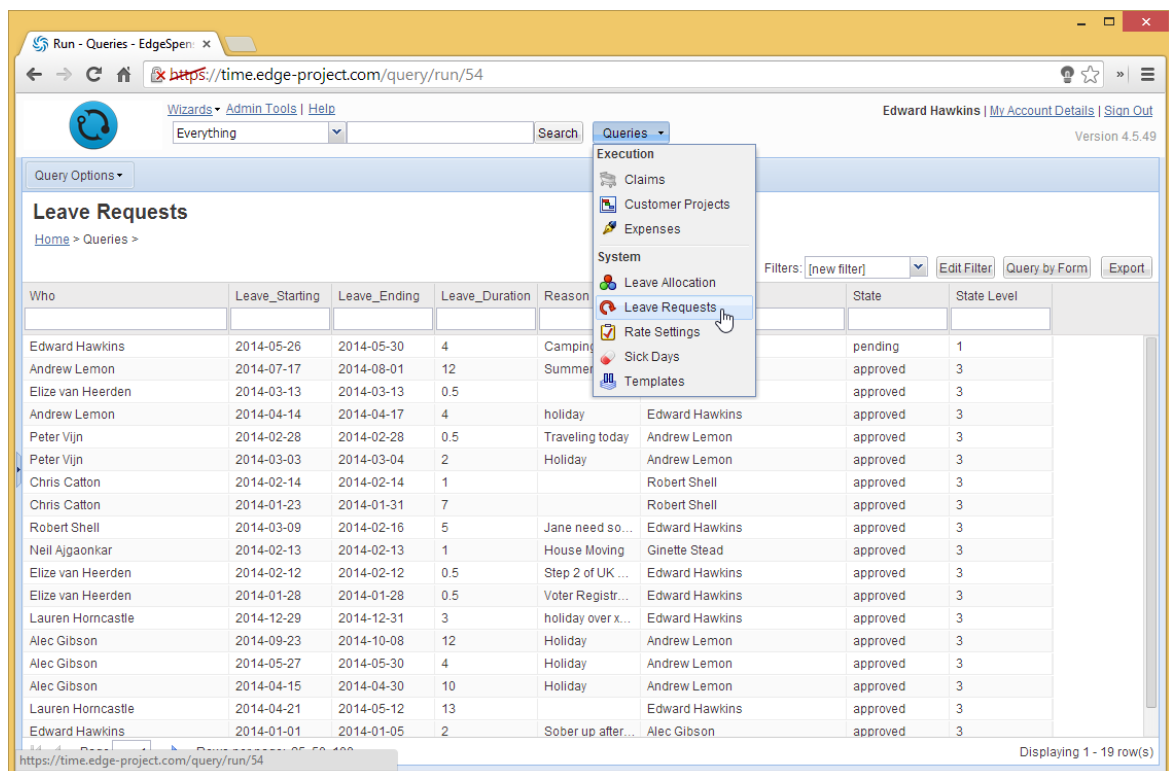
The line manager can approve or reject the leave request and the system will send an email to the employee informing them of the decision.



Approving a number of pending leave requests

2.2.7 Reporting

Details of all approved and rejected leave requests can be searched and reported against. Access to these reports is restricted to employees with line management responsibility.



Leave request report

2.3 Sick Days

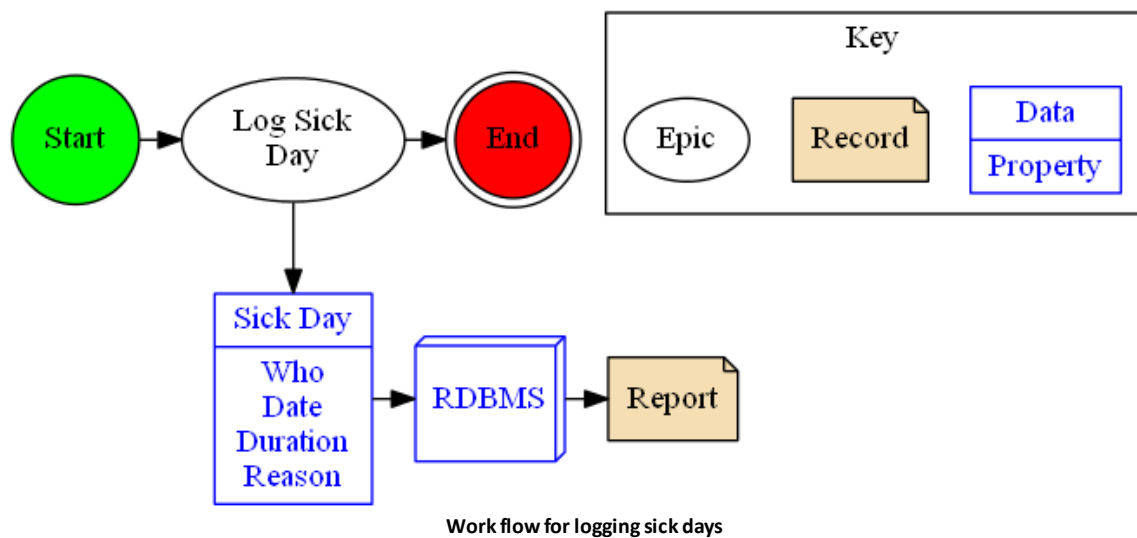
In reaction to an increase in the number of employees, we required a system for tracking sick days in support of the company's sickness policy. This generated the following requirements.

2.3.1 Requirements

- **Logging** - The line manager must be able to log sick days for an employee with dates and reasons.
- **Reporting** - Management must be able to review sick days by employee.

2.3.2 Implementation Overview

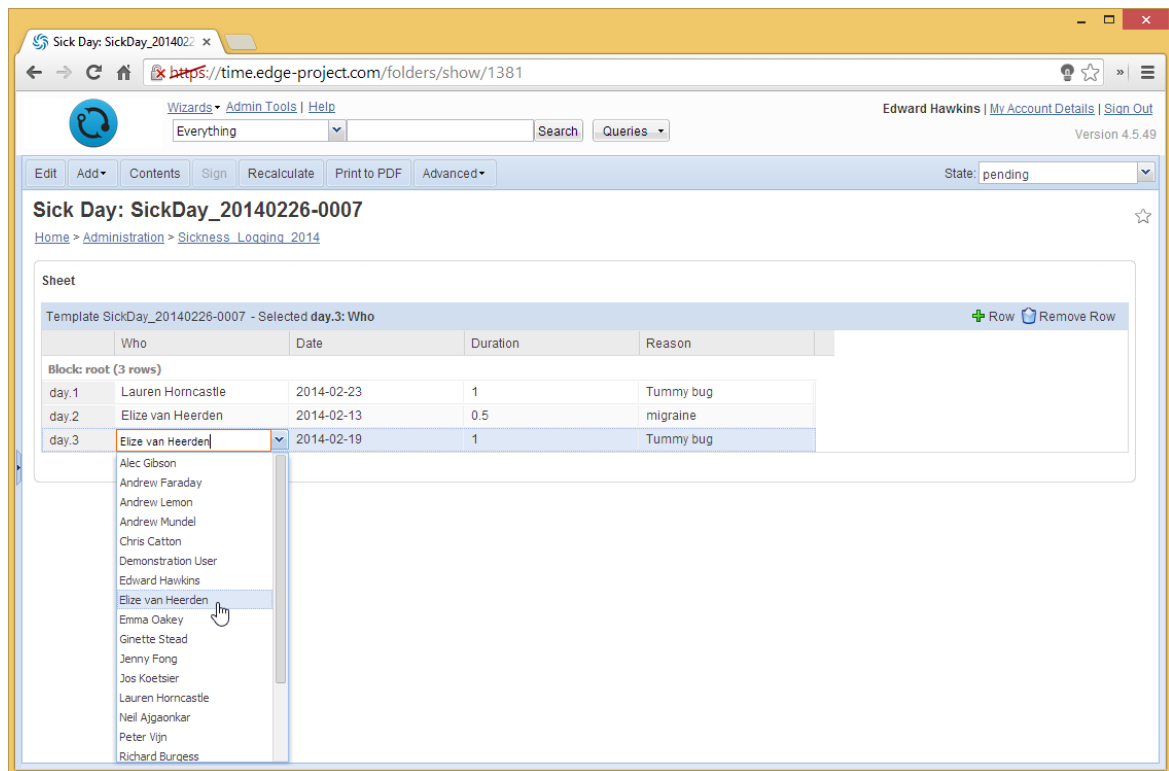
Logging of employee absence (sick days) was achieved using simple tasks in the Morphit Enterprise web application without the need for supporting binders.



2.3.3 Sick Day Template

Employee absence or 'Sick Days' are stored with the following data:

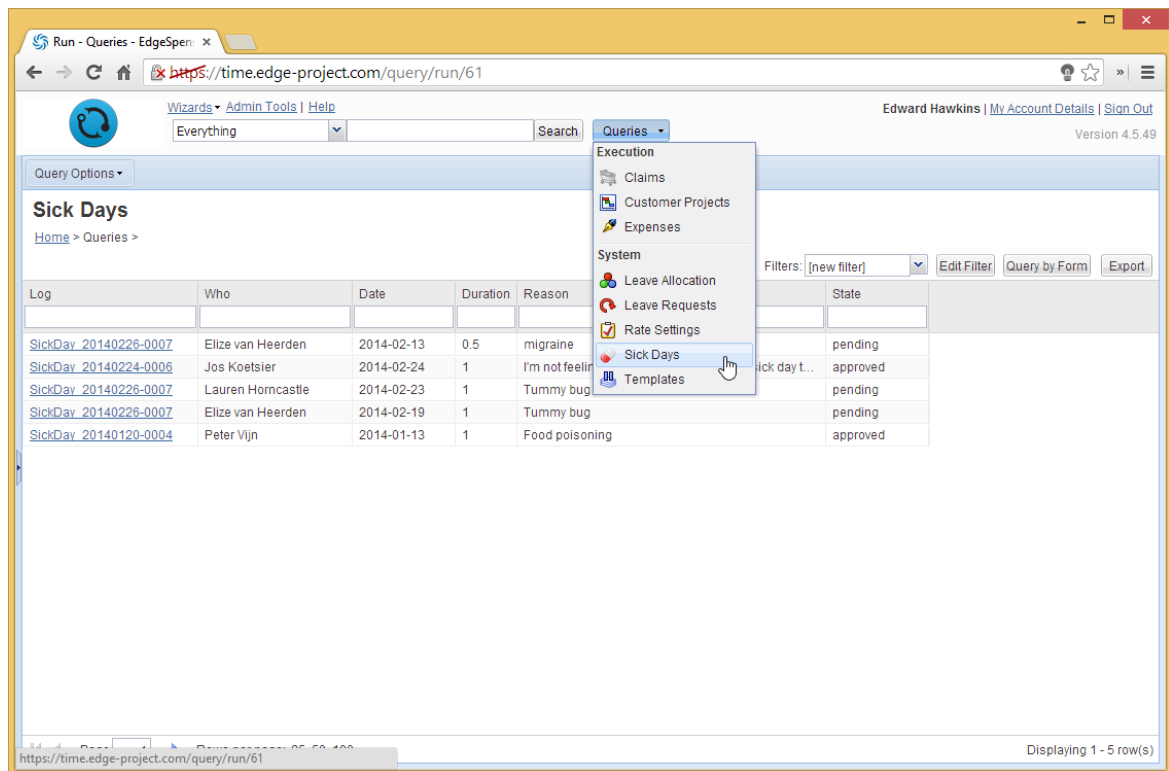
- Who (Dictionary)
- Date (Date)
- Duration (Decimal)
- Reason (Text)



Sick day task

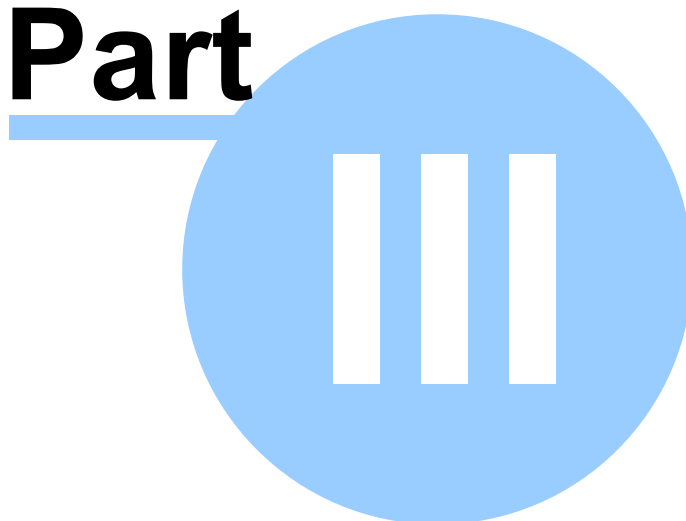
2.3.4 Reporting

Details of all logged sick days can be searched and reported on. Access to these reports is restricted to employees with line management responsibility.



Sick days report

Part



3 Results And Conclusions

3.1 Knowledge gained

In these sections will describe the lessons learned in terms of usability issues, controlling scope and added value provided by desktop applications and why documents alone are not enough.

3.1.1 Usability Issues

Despite the main users of this application being developers or expert application users, it can never be too simple. The application was simplified, without disrupting the primary use cases, by removing as many decisions points as possible.

3.1.2 When is it Good Enough?

The effort made in capturing user requirements and design, combined with an agile methodology, meant that change was accommodated and it was clear when the project was ready for production.

3.1.3 The Added Value of Desktop Applications

Morphit spreadsheets proved invaluable as they allowed expert users to implement complex business models quickly and without the need for software development and deployment.

3.1.4 Documents Are Not Enough

The use of centralized storage and deployment of documents, combined with structured data and workflow, enabled the system to scale from being a point solution to an enterprise one.

3.2 Planned Improvements

Based on the success of the project, extension to other financial operations such as customer quotations, project estimates and invoicing is being considered. This will allow tracking of company finances and modelling of future revenue growth.

3.3 Conclusions

Morphit Enterprise is adaptable enough to apply to generic business problems. The scientific pedigree of the software provides extensive support for numeric data recording, making it applicable to finance and engineering domains. The system overcomes many of the problems associated with document based systems, and enables spreadsheet solutions to be deployed and managed across large groups of users. It does this without the usual issues of change control and maintenance, thus minimising the total cost of ownership.

Part



IV

4 Biographies

4.1 Ted Hawkins

Ted Hawkins is both the VP of Product Delivery and a founder of The Edge Software Consultancy Ltd., where he is responsible for setting product direction and the delivery of systems to customers. Ted has been implementing data management and spreadsheet solutions to researchers in drug discovery since 1996. This has included validated environments with roles encompassing project manager, business analyst and 'spreadsheet guru'. Ted gained a Ph.D. in environmental physics and entomology from Nottingham University, in 1995, where he was first exposed to the use of relational databases. Before that, in 1992, he received an M.Sc. in environmental pollution from the University of Manchester, where he first started using spreadsheets seriously for population dynamics. This followed on from a B.Sc. in Biology (Hons) in 1990, also from the University of Manchester, where he received his grounding in the biological and statistical sciences and lost his hair.

4.2 Andrew Lemon

Andrew Lemon is a founder and chief executive officer of The Edge Software Consultancy Ltd. He is business lead, focusing on business development and marketing whilst maintaining his consulting portfolio. A specialist in life science informatics, Andrew has been focusing on helping organisations to implement and maintain sustainable systems and business processes for over 18 years. He has experience covering the full product life cycle, from inception to replacement. Andrew works with leading pharmaceutical and biotechnology companies from around the globe, analysing their processes and implementing solutions. He has a PhD in Computational Chemistry from the University of Bath and has been in the scientific software industry for all of his career.

