

An Actuarial Toolkit

Introducing

“The Toolkit Manifesto”

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Executive Summary

- We've found some exciting tools and have given some examples on our website www.toolkit.pbwiki.com. But you have to play with them to see their value. We're sorry but we're **delegating your CPD to you**.
- Business often has a one-size-fits-all strategy to IT. Reliance on Microsoft Office limits our capabilities. There are lots of other tools out there, so **pick the best tools for the job**. Some really are great and surprisingly are often free.
- In just 5 years wikipedia has become 12 times larger than the print version of the Encyclopaedia Britannica. This shows the power of the hive mind. The concept of reader and author are merging. The profession's (our) key aim should be to **harness our collective intelligence**.
- Publishing is now free and easy. The individual voice can be heard without institutional barriers; "hyperlinks subvert hierarchy" (Cluetrain manifesto). This encourages individuals to re-engage; a profession is a collection of individuals after all. **Actuary 2.0 is needed**; we need to evolve.
- Recycling is good for the planet – it is also good for progress. Don't reinvent the wheel. It has never been easier to **search out and use Prior Art**. **If you find a useful tool, post it and tell the world**. Stand on the shoulders of giants.
- We have more tools and capability on our home PCs than we do at work. This is because innovation is stifled by current IT policies through fear of viruses and abuse. This risk is manageable without totalitarianism. We need to trust people more; we need to knock down walls. **We need a new relationship with IT**.
- We've spoken before about wikis, R, blogging, RSS, etc. Having used them for another year we have more to say. So we've included a section on so **some "old" tools and some new ones**.
- The majority of our effort this year as gone into the toolkit wiki. We didn't think it was a good idea to print it out in full! But we have written an example blog **plugging our favourite wiki pages** we hope these are the start of a valuable resource and encourage others to contribute.

Table of Contents

Introduction	4
The Toolkit Manifesto.....	5
Web 2.0	6
Actuary 2.0	8
Prior Art	9
We need a New Relationship with IT.....	10
Useful Tools	12
Wikis.....	12
del.icio.us.....	13
Reading Lists.....	14
R – free and powerful stats software	15
Plugging the toolkit wiki.....	17
References (aka Prior Art).....	20

Introduction

Upon reading the title of this paper, you might expect a textbook of useful actuarial techniques. Upon seeing the length of this paper, you would realize you were wrong!

Whilst providing a repository of knowledge may be the ultimate goal of this working party, we're intending to delegate that task to you¹. Our focus has been to develop the medium for that knowledge and in particular explore the usefulness of online collaborations and software tools, which may help us in our day to day job.

This year has been an interesting one for the toolkit working party:

- We changed our name from "Maths Toolkit" as many pointed out there wasn't much maths in last year's paper!
- We have been developing our wiki www.toolkit.pbwiki.com and have found this to be a user friendly and powerful way to work as a team from different locations.
- The article "Internet Power Tools" was published in "the actuary" in May.
- One of the group has been to South Africa to give a "toolkit" presentation to their actuarial society.

This paper considers the changing environment in which we are working, sets out our vision for the Toolkit (our "toolkit manifesto"), considers what needs to change and examines some of the tools which may prove useful to the modern actuary.

It is said that "Repetition is the mother of all learning"². Some of what we say below is similar to comments in the 2005 toolkit papers or the "Internet Power Tools" article. We make no apology for this; these are great tools and worth talking about ad nauseam. We've also built on what we have said before and can now show you some actuarially relevant examples.

As with previous toolkit papers this one provides only a brief summary of the topics in question. Instead it contains links to many useful and more comprehensive sources. We urge you to read this paper in its native electronic format (available on the toolkit wiki) and explore some of these links.

¹ we are one of you; and we will help with this

² repetitio mater studiorum est (apparently!!)

The Toolkit Manifesto

Imagine a dentist with a Swiss army knife as the only tool they have. Maybe they can manage their job but would you choose them to look after your teeth? We expect you would rather choose someone with a choice of the best tools available.

In our profession the equivalent to the Swiss army knife is in most cases the Microsoft Office suite; which we use for most of our tasks without, perhaps, being aware of better or more appropriate tools.

With only a limited set of tools at hand you will limit your capabilities to what you can accomplish with just those tools. Awareness and availability of other tools is always good. **Pick the best tool for the job**; its obvious really isn't it?

Why don't we always pick the best tools?

- Because we are not aware of them. CPD is not just about keeping up with regulations; we need to keep up with the world around us. We need to make use of existing technologies and methods, rather than starting from scratch each time. IT professionals refer to this as "Prior Art" - we need to **search out and use Prior Art**.
- Because we are prevented from doing so by our IT policies. This has to change. **We need a new relationship with IT**.

Later we talk about some tools we have found to be useful. These have evolved into powerful, useful and free technologies. They have done this by being able to **harness collective intelligence**. We believe increasing this type of collaboration would help drive our profession further and faster.

To do so requires us to share our experiences; we want to hear about what interests you, what tools and methods you have found or developed to make your job easier. This is what we mean by collective intelligence. So **if you find a useful tool, post it³ and tell the world**.

The Cluetrain manifesto suggested similar ideas (and more) some years ago. Here is our smaller, but, we think, still worthwhile "Toolkit Manifesto".

- **Pick the best tool for the job**
- **Search out and use Prior Art**
- **We need a new relationship with IT**
- **Harness collective intelligence**
- **If you find a useful tool, post it and tell the world**

³ by "post it" we mean comment on it on the internet; on a blog or on our toolkit wiki for example. (If you can find footnote 4 we'd be delighted to have it returned to us! Note 5 should be on the next page – that's WORD for you.)

⁵ See www.realclimate.org for a great blog about climate change for example

Web 2.0

The next big thing in 1448 was a technology called “movable type”; invented for commercial use by Johannes Gutenberg, a goldsmith from Mainz. The clever idea was to cast individual letters (type) and then compose (move) these to make up printable pages. It promised to disrupt the mainstream media of the day in which monks manually transcribed texts or carved entire pages into wood blocks for printing. Within decades movable type spread across Europe, turbo-charging an information age – called “the Renaissance”.

The era of mass media had begun. Content was created by a few and consumed by many. Radio, television and later the internet provided new mediums, but the content remained somewhat static.

In 2001, “Movable Type” was invented again, this time, in the form of a “blogging tool”. A blog is an online personal journal (or **web log**), the likes of which have become incredibly popular recently. Blogs have spread beyond IT and popular culture and are starting to influence politics, journalism, etc⁵. Now anyone with access to the internet can publish.

This second incarnation of Movable Type marks a transition to a new era, which might be called the age of personal or participatory media. Individuals are empowered to interact with existing media and create their own through blogs, wikis, comments, online discussions, etc. Some are calling this new era “Web 2.0”. It is a culture is already familiar to teenagers

There is a huge amount of disagreement about just what Web 2.0 means, with some dismissing it as a meaningless marketing buzzword, and others accepting it as the new conventional wisdom. Our interpretation of Web 2.0 is that it is all about users interacting (using software within a browser via the web) and creating content (forums, web logs, myspace, wikis, ...) rather than passively consuming it. In this sense Web 2.0 aims to **harness collective intelligence**. With Web 2.0 the differences of user and provider of information vanish. The internet has no hierarchy anymore; everyone can contribute and use it.

Hyperlinking is a foundation of the web. As users add new content, it is bound in to the structure of the web by other users discovering the content and linking to it. Much as synapses form in the brain, with associations becoming stronger through repetition or intensity, the web of connections grows organically as an output of the collective activity of all web users creating their own content.

This organic structure promises to make the web much more powerful; and we are already starting to see the benefit of this. For example Google’s success has been due to its ability to use this linking structure. We discuss the more recent examples of Wikipedia and del.icio.us later in this paper.

The free collaboration of users has also resulted in some incredible successes, with much of the infrastructure of the web and major websites (Google, Amazon, etc.) rely on the peer-production methods of open source software (such as Apache, Linux, MySQL, Perl, Python, etc.).

There are more than 100,000 open source software projects listed on SourceForge.net. Anyone can add a project, anyone can download and use the code, and new projects migrate from the edges to the centre as a result of users putting them to work. It is an organic, evolutionary software adoption process. In fact there is even an actuarial [project!](#)

R, the most popular statistical software package among statisticians and discussed later in this paper, is one product of this open-source initiative. We believe that sharing knowledge in this open-source manner is key to the success of the Toolkit. The R section of the Toolkit wiki already contains many useful examples of R code.

There are many more aspects to Web 2.0 and we have highlighted a few of those aspects which may be useful to actuaries. A comprehensive discussion may be found in Tim O'Reilly's [article](#). However, it should be clear that the principles underlying Web 2.0 form the foundations of our vision for the Toolkit.

Technology is changing very rapidly, and we need to keep up. Based on the ideas of Web 2.0 we believe it is time for a change in the concept of "actuary"; it is time for ...

Actuary 2.0

The modern actuary works in a rapidly changing environment.

This change has been driven from within, in an effort to further the profession and individual careers. For example over the last 30 years, general insurance actuaries have spread from a primarily reserving role into a much broader remit, including pricing work.

Change is also being forced upon us by regulators and rating agencies. The Individual Capital Assessments in the UK and Solvency II in Europe are thrusting more and more actuaries into a capital modelling role.

Change is also being demanded of us by our clients. With a taste of the benefits of capital modelling, our clients are seeking to manage risk in a more sophisticated manner. Capital allocation, risk management and financial planning are increasing areas of work for actuaries.

The Morris Review was generally appreciative of individual actuaries but found our profession too insular with too little focus on life long learning. As we shall discuss later, **Web 2.0 provides many tools to assist with this objective and we urge the profession to adopt them.**

In this changing environment, the techniques and tools that were appropriate previously may not be suitable going forwards. For example, for capital adequacy purposes we need to determine a probability distribution of potential claims outcomes. Traditional reserving methods which only provide a point estimate are not sufficient. In this situation, life long learning becomes incredibly important so that an actuary always has available the most appropriate tools for the job.

Many actuaries are not fortunate enough to have in-house help available to them whenever they face a new problem. This is especially true in the smaller companies or on the frontiers of actuarial practice. In this situation, it is important to **share knowledge and experience**. GIRO is one very successful forum for this exchange; modern advances in technology provide options that can enhance this process. The Toolkit is our attempt to harness some of this technology.

For wider fields (Risk management, banking and investment, health, construction, and so on) there is even faster development and less help available. It becomes much more important to tap available information effectively rather than reinventing the wheel for each new problem. This leads to the topic of our next section because we believe we should all **search out and use Prior Art**.

Prior Art

It is sometimes said that a person's greatest strength in some situations can be their greatest weakness in others. For example, an underwriter may be highly praised for their attention to detail; never missing any crucial fact. But put them in a “future strategy” meeting and their “strength” may be perceived as holding up the process.

Actuaries are generally clever. And clever people like to solve problems; and they like people to know *they* have solved them. Being clever is a strength. But if it tends to make us want to start from scratch all the time, then it is a weakness.

Prior Art (see http://en.wikipedia.org/wiki/Prior_art) is a term often used in the IT industry for finding examples where the problem or a similar problem has been solved before. The idea being that you start where they left off.

Another way of looking at this (and the toolkit project as a whole) is as follows:

- **Type 1 Personal Resource.** If we have a particular problem, we might already know a way to solve that problem, or one like it. In other words have a technique which is familiar to us personally that we can use to solve this problem. This approach, the **personal resource**, uses the least effort.
- **Type 2 Group Resource (“Prior Art”).** If we don't have a method for solving the problem we might have some resource (a book, website or person) specific to the subject area which might highlight some appropriate technique for the particular problem. This requires some more effort, but is still not too bad.

If that fails then we might look for a resource in a less related area. This would take longer (as there is more stuff to search) or might require more customization to the particular problem.

- **Type 3 Original Research.** If that fails we need to attack the problem from scratch. This is a bespoke solution with all the problems and effort that requires. Though, of course once you have tackled a problem, you might learn a new technique which might help you, or others, next time.

What we are trying to do with the Toolkit is build a resource of the second type – a **group resource**, so that: once one person learns something AND realizes that it might be useful to others AND incorporates it into this resource, then EVERYONE can benefit.

Many of the tools we are suggesting in this paper take the form of software, freely available from the internet. If you are prevented from trying these out by your IT policy then you cannot see their potential. This is why we **need a new relationship with our IT departments** in our view.

We need a New Relationship with IT

It is bizarre that many of us have more power on our home PCs (and the ability to optimize them to our needs) than there is at work. We can download and trial software or take a look at things others have recommended. At work all this is restricted (at least it is for us; we're assuming it is for you too). Click an executable file at your peril; in fact these days you can't.

In this paper, we have suggested various tools which could be of use to actuaries, but what use are they if you can't use them at work? It's time for a new relationship with IT.

The idea that "IT" is a separate activity from the day to day running of a business is fundamentally flawed in our view. An alternative and we think better, model would be for each department to have as part of the team IT experts who are much closer to the needs of the team. There will be a core of activity that can be outsourced to an IT team (possibly outsourced outside the company as is increasingly the case). But new software needs should be **discussed** and installed at a *local* level. That's the key point; we need an ongoing conversation with them.

Actuarial work is not vanilla; it is exotic. This fact doesn't fit with the one-size-fits-all approach to IT that many of us are faced with at work.

It really doesn't need to be this way. Viruses are a risk and the data protection act requires that data be kept safe. But these days it is possible to run a "virtual PC" on your machine which will manage this risk and still give freedom to evolve. A virtual PC is basically a sand box in which you can play that is isolated from your network. This technology is not very expensive and not that new. If IT departments really understood the needs of business they would be suggesting this to us! That is part of the problem; there isn't (it appears to us) enough conversation between users and IT experts.

Actuaries and IT experts have much in common: we are both professionals; most of us are highly intelligent; and we are both unfairly described as dull! Working closer together should lead to greater recognition of the crucial work we both do as part of the team. But that is the key word **team**. Where did the "separate IT department" come from? Perhaps when mainframes were in a single room so the team that maintained it had to be physically separate?

In summary, we suggest that companies need to rethink the organization of their IT "departments"; in the same way that "risk management" should be (and is being) embedded in the business IT teams should be split up and allocated to business teams.

Within the working party we have faced problems with IT and new software. Engaging with the IT department does seem to be the most constructive way

forward, but sometimes saying, “I need it for this urgent project” gets the job done faster! Here is a quote from Sie:

*“I was first introduced R Software from GIRO in October 2005. I was very impressed by what R can do especially for actuaries and wanted to try it on my work PC. I somehow **struggled to actually get R Software installed.***

*Working in a small UK branch of a German insurer does not mean that the IT function can be more flexible. Given the contagious nature of viruses associated with external free and untested software can do to company’s PCs, it can be understandable why IT have adopted such a strict policy. However, it is not all bad news in the end. **After 4 months** of perseverance, I have **finally managed to convince IT** that the software may be of good use to the company after all. How did I do it? By attending the first toolkit meeting has helped to discover more potentials on R. So I have come up with several possible uses of R including reserving and capital modelling. It will be useful sometimes to just **quote a few names of people using R** who have influence in the field (Lloyd's etc). I also show the working document on R which is developed by Nigel et al. I guess the bottom line is **to get IT to understand that the initiative is a genuine one and must be in the interest of the company.** Also by doing homework on the software will help, such as having knowledge of its basic features, related websites and history/source etc.”*

Smart companies know that tools to help employees work better together can be an important competitive advantage. Teamwork, in the industry jargon also called “Enterprise Collaboration”, is an important factor of production.

“Over 80 per cent of the CEOs of large-scale enterprises consider according to an IBM survey the introduction of team collaboration techniques necessary within the next 2 years. Products which worked satisfactorily within the private sector (Chat, Blogs) and for social networks (Wikis and forums), are getting introduced into enterprises.”

John Seely Brown
Former chief scientist at Xerox
Speaking at a Collaborative Technologies Conference Boston June 2006

Assuming you can find a way past your IT department (or perhaps you are going to try this at home?), you’ll want to know about some of the tools we’re talking about. The next section mentions a few (some old, some new).

Useful Tools

Given we are the toolkit working party we thought we should talk about some tools! By tools we mean both software and methods, but in this paper we've stuck to the former. We've mentioned some of them before – but now we've used them for longer we can comment with an actuarial flavour.

Wikis

Wikipedia, the online encyclopedia, defines a [wiki](#) to be “a type of [website](#) that allows users to add, remove, or otherwise edit and change all content very quickly and easily, sometimes without the need for registration. This ease of interaction and operation makes a wiki an effective tool for [collaborative writing](#).”

With over 1m articles in its English-language version, it is almost 12 times larger than the print version of the Encyclopedia Britannica. Taking in the other 200-odd languages in which it is published, Wikipedia has more than 3m articles. It is already ranked as the 16th most visited website in the World and has become a vital research tool for huge numbers of people. All this and Wikipedia is only five years old.

Wikipedia, however, is unusual in that it appeals to such a large diverse population. **Most wikis are used by relatively small strongly defined groups of which the actuarial profession is a perfect example.**

Wikis are commonly used for project management purposes and we are aware of various companies who have successfully used them.

However, the most common use for wikis is for knowledge management purposes – to provide a group resource of the kind described in the Prior Art article. We have attempted to create this type of resource in...

The Toolkit Wiki
(<http://toolkit.pbwiki.com/>)

With a knowledge base that is constantly changing, and being updated potentially by many people, we need a tool like this to store the information⁶. It is easy to change edit or add new content. **Have a go yourself.** (Password is “GIRO”.)

What we really need is examples, as they help bridge the gap between theory and practice. These could be examples of techniques, but they could also be examples of problems. Please do visit the site and have your say.

⁶ Mailing lists sometimes perform a similar job, but they tend, annoyingly, to clutter up your inbox.

Within the working party we have successfully used our Toolkit wiki to collaborate on this paper. Wikis have also been used by the ICA and Climate change working parties and by the Environmental Research Group – all actuarial collaborations.

del.icio.us

del.icio.us (<http://del.icio.us/>) is a social bookmarks manager. You can bookmark interesting websites (or articles, documents, blogs, music, restaurant reviews, etc) and categorize them with multiple tags.

You can then access your bookmarks from any computer attached to the web (i.e. at home or at work). You can also access anyone else's public bookmarks to see what they have found interesting. After all, **everything on del.icio.us is someone's favourite** – they've already done the work of finding it, so you just have to explore and enjoy.

Here are our delicious accounts – feel free to see what we are reading:

- <http://del.icio.us/sielianglau/>
- <http://del.icio.us/maynardt/>
- <http://del.icio.us/harriette/>

When you have many bookmarks, this tagging allows you to retrieve them quickly. For example, if you were to bookmark the electronic version of this paper, you may wish to tag it with the following tags:

actuarial, GIRO, conference paper, web 2.0, toolkit, R.

Suppose later you wanted to locate this paper; searching with any combination of the previous tags would work.

The most useful aspect of del.icio.us revolves around this tagging. The more people have found a website useful, the more times it will have been tagged and the greater chance it will be useful to you. Searching for a tag and listing the results by the number of times that website has been tagged can return much more relevant and useful results than a similar search in an alternative search engine such as Google or Yahoo. Ordering the results by date provides the most recent bookmarks and perhaps the latest information.

As well as storing your favourites, a del.icio.us account also has an inbox. This is used for sharing bookmarks with friends, family or colleagues, by tagging sites for one another. Just tag a bookmark with **for:<name>** (e.g. for:maynardt) and it will be sent to their inbox.

A potential use for this might be the profession's reading lists which provide a good introduction to various aspects of actuarial work. They are published in paper form (though available electronically), so no dynamic links are

available. As more and more papers are published online a set of bookmarks might be a better option. These could be tagged according to topic.

When an actuary stumbles across a useful resource, he/she could tag it for the reading list. The list's administrator could review his/her inbox and decide to whether to include it in the reading list.

Reading Lists

In this section we consider reading lists in the context of keeping up to date with the latest news in a subject matter (rather than an introduction to that area). We build on the concept of "subscription" to websites using some sort of RSS aggregator. Some of you may be using these either before or since our paper last year; for those that are not, we'll briefly recap how they work.

An "RSS feed" is (in a sense) a snapshot of a webpage. Not all websites have RSS feeds, although many modern ones do. When a website is updated the RSS feed will also be updated to record and describe the change. So, if you compare an old version of the RSS feed with the new one you can tell whether a website has changed; and how.

This is what RSS aggregators do (e.g. [SharpReader](#) or [GoogleReader](#)). When you "subscribe" to a site using an RSS aggregator, it stores a version of its RSS feed – then periodically and automatically it compares its stored version with the latest RSS feed from the website. If the two files are different your aggregator knows the website has changed and it alerts you.

One of the nice things about our toolkit wiki is that it has a very rich RSS feed. So when a member of the working party changes the site our RSS aggregators don't just alert the change – they say who changed it and briefly summarize what they did. This makes alerting fellow working party members very efficient – **there is no need to email; one fewer job to do.**

Your list of "subscriptions" (the web pages you are interested in) is saved in a file by your aggregator. In case you are interested, the file is called an OPML file (so it ends .opml as apposed to .xls for an Excel file for example). It is possible to send your OPML file to someone else. It is also possible to give your OPML file a web-address. Take a look at:

<http://toolkit.pbwiki.com/SharingOurOPML>

This enables others to download and import your subscriptions; to see what you are reading (Try it! Visit the web page above – we've given instructions). This might sound esoteric – but it is actually an exciting prospect. Another description of a "set of subscriptions" is a "reading list".

Here's a vision for the future involving RSS feeds:

In the previous section, we envisioned the profession (or for that matter a working party) producing a dynamic reading list of useful documents, perhaps on a wiki or a del.icio.us account. Actuaries wanting to stay up to date with that topic (or working party's output) could subscribe to the RSS feed and automatically be informed of updates without the need for maintaining mailing lists and email circulars.

Secondly, imagine that actuaries want to keep up to date with latest developments in one field or another (we think this is true). The chances are that several websites are particularly useful providers of latest news in that field. The profession (or a working party, or an individual actuary) could publish their OPML file which subscribes to those sites. Interested actuaries could then import **just this one file** into their aggregator to stay up to date. Currently, for most aggregators, this is still a manual process⁷, but it really isn't that onerous. Automation will come, making the entire process even simpler.

R – free and powerful stats software

Thirty years ago at the Bell Labs statistician developed a computer language for statisticians. They called the language S. Today there exist two implementations of this language; the open source (and free) variant R and the commercially sold product S-plus by Insightful.

R (and S) is the `lingua franca' of data analysis and statistical computing, used in academia, climate research, computer science, bioinformatics, pharmaceutical industry, customer analytics, data mining, finance and by some insurers.

“Apart from being stable, fast, always up-to-date and very versatile, the chief advantage of R is that it is available to everyone free of charge. It has extensive and powerful graphics abilities, and is developing rapidly, being the statistical tool of choice in many academic environments.”

R. Kaas
The R in Modern A.R.T.

Over 400 people from all over the world attended the R user conference in June 2006, also in Vienna. **R is already used for actuarial education**

⁷ at time of writing there is only one aggregator, Newsriver, which is more automated by supporting http based opml files

in Canada (University of Laval, see the “actuar” package on cran.r-project.org). Within Lloyd’s, R is used for producing management information tools, benchmarking and data analysis.

The power of the language R lies with its functions for statistical modelling, data analysis and graphics; its ability to read and write data from various data sources; as well as the opportunity to embed R in excel or other languages like VBA. In the way SAS is good for data manipulations, R is superior for modelling and graphical output.

R has its home at www.r-project.org. Further information and examples on R in the insurance environment can be found on our toolkit wiki [page](#).

You may be disappointed when you start R on your computer after you have installed it. All you will get is a white window with a blinking cursor waiting for you to input commands in its language. To use R you will have to read the documentation, a good starting point is “[An Introduction to R: Examples for Actuaries](#)” by Nigel De Silva from the toolkit’s web page.

But what sounds quite de-motivating in the first place has also its advantages:

- You have to write down what you would like to do, as R is language. Writing down your thoughts is never a bad idea.⁸
- It is easier for other people to verify what you have done, as it is written down. Compare this with a spreadsheet, where numbers may be the result of a formula or hard coded.
- It is easy to write generic re-useable functions, similar to VBA; not unlike the idea of moveable/re-useable letters of Gutenberg (you can even embed them into VBA if you want).
- Existing code in other languages (e.g. Fortran) can be embedded within R
- No magic buttons with hidden functions, it is easier to explain what to write than where to click (left, right, middle, or double-click?) and which options to tick or un-tick on which tab or submenu.

R, being free, could be the statistical language in which we exchange ideas and present concepts from actuarial papers, in a way that they can be used by others without rewriting code (and making the same mistakes again).

But crucially, **R is brimming over with Prior Art** (GLMs, Graphics, Bayesian Methods, FFTs, Kernel Smoothers, etc) all the tools that academics are using; all waiting to be applied.

⁸ Louise Pryor (www.louisepryor.com) has been pointing out for some time that working in Excel is still programming – but in a loose and dangerous environment. R forces you to recognise you are programming.

Plugging the toolkit wiki

This section has been written as an example blog (note that posts are in reverse chronological order, with the most recent at the top). We are linking to some pages on the toolkit wiki and providing a small amount of information to encourage you to follow the link. This sort of thing is precisely what we are urging other actuaries to do; **if you find a useful tool, post it and tell the world.**

A blog is only one of the options available; you may prefer to just add a page to the Toolkit wiki.

AN ACTUARY'S BLOG

MONDAY, 17 JULY 2006

Reserving Package

Some people from the R-souls group have been collaborating to produce a package of reserving functions. They've been using it to learn about R and trying to implement reserving methodologies that they've found in recent papers. They haven't got very far yet, but it looks quite interesting.

The code is all open, so I'll check it out. Perhaps I'll add some adjustments of my own?

posted by An Actuary at 9:37 AM

0 comments

TUESDAY, 27 JUNE 2006

R souls

It looks like some of the Toolkit working party have been meeting regularly to discuss R. They've called themselves "R-souls", though I'll bet other people called them that first! :-)

They've set up a series of pages recording some of their discussions see <<link>>. It looks like the wiki has an RSS feed, so I have subscribed to it to stay up to date.

posted by An Actuary at 5:17 PM

0 comments

WEDNESDAY, 5 JULY 2006

Analysis of AMO

I noticed this interesting climate change [paper](#) published by Lloyd's where they analyze AMO data and show the correlations to the number of major hurricanes. This [page](#) explains how the graph is produced.

posted by An Actuary at 9:05 AM

0 comments

FRIDAY, 23 JUNE 2006

Random Number Generation

Declan Lavelle has set up this interesting page on random number generation. As usual the standard method in Excel has its flaws....See [here](#)

posted by An Actuary at 4:15 PM

0 comments

WEDNESDAY, 14 JUNE 2006

Getting data into R

You might want to store you data in a database of some sort. R has a great package RODBC which allows you to query the database directly via SQL. To do this you have to set up a connection (and "ODBC link"). This sounds complicated; it is actually very easy and intuitive. I found this simple [page](#) which explains what to do.

posted by An Actuary at 1:48 PM

1 comments

Comments

1. Thanks for the post; that is going to be really useful. It's also worth noting that there are other ways of getting data into R. Using the read.csv function for example allows simple csv files to be imported. You can even paste in from the clipboard.

Posted by A different Actuary at 3:27 PM, 14 June 2006

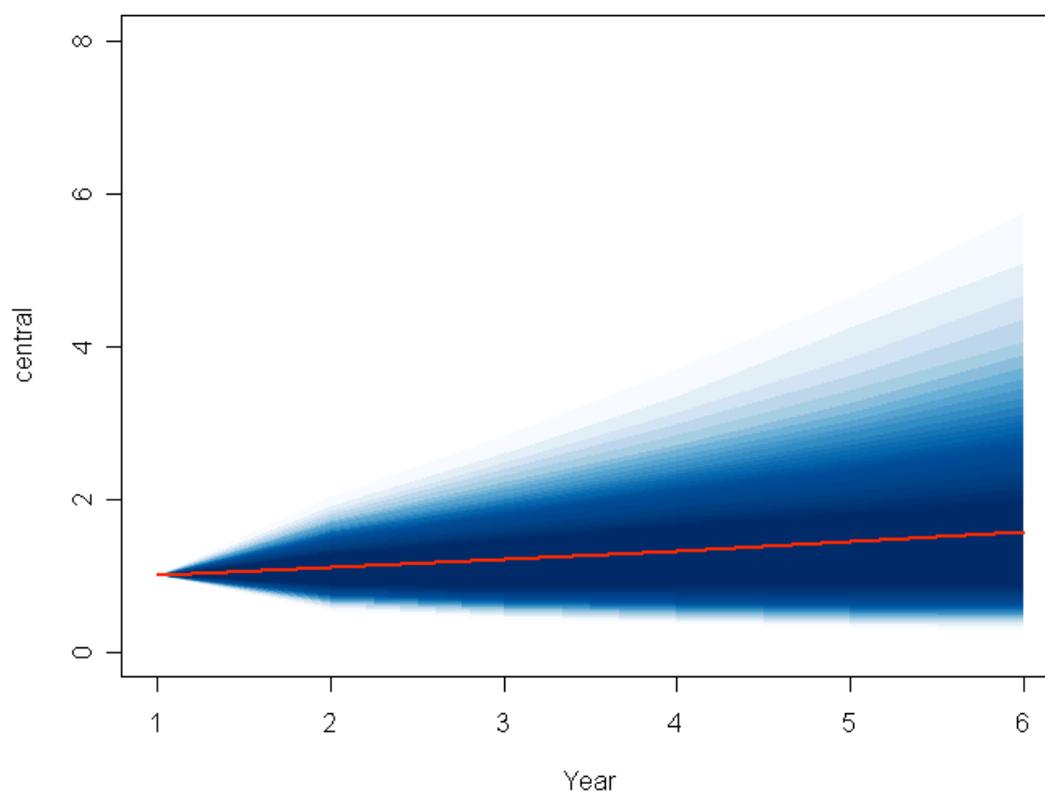
THURSDAY, 1 JUNE 2006

R colours

Have been testing R's graphical capabilities, it has some great in-built plotting functions. These can be significantly enhanced (or branded) by using custom colours. There are a number of packages which make your life easy, some of which are reviewed on this [page](#)

Here's a [function](#) I wrote to produce the graph you see below:

Projected Assets



posted by An Actuary at 10:48 AM

1 comments

Comments

1. Neat! Have you seen the R Graph Gallery? It contains lots of graphing examples together with R code. Follow this [link](#).

Posted by A completely different Actuary at 3:42 PM, 7 June 2006

MONDAY, 15 MAY 2006

R examples for actuaries

Nigel has written a really excellent introduction to R with an actuarial flavour. This can be downloaded as a document or perused on line (with active links!), see this [link](#).

posted by An Actuary at 4:41 PM

0 comments

References (aka Prior Art)

R. A. Becker and J. M. Chambers. *S: A Language and System for Data Analysis*. Murray Hill, New Jersey, January 1981

Thomas Baier and Erich Neuwirth. *RExcel and R(D)-COM server*. R Foundation for Statistical Computing, Vienna, Austria, version 2.2.0 edition, 2006.

<http://cran.r-project.org/contrib/extra/dcom/>

Nigel De Silva. *An Introduction to R: Examples for Actuaries*. Actuarial Toolkit Working Party, version 0.1 edition, 2006. <http://toolkit.pbwiki.com/RToolkit>

Tim O'Reilly, *What Is Web 2.0? Design Patterns and Business Models for the Next Generation of Software*, September 2005,

<http://www.oreilynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html?page=1>

R Development Core Team. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria, 2005. ISBN 3-900051-07-0

John Verzani. *simpleR – Using R for Introductory Statistics*, version 0.4 edition, 2002.

<http://wiener.math.csi.cuny.edu/Statistics/R/simpleR/>