

Thanks to everyone involved in arranging and running today. Most particularly to Steve ably supported by Margaret, Caroline et al. Thank you so much. Jackie, Yohannes.

Way
Evolving the NAG Library
Brian Ford

"Evolving the NAG Library"
The title of my talk purposely contains much ambiguity.
Three different topics in the one title
By putting particular emphasis on a particular word.

Evolving (implies moving forward deliberately; 'NAG' = our particular way
Way - emphasising find a route for the Company.

Way

- Way of doing things
- Way (Route) followed
- Way of proceeding (organisation)

Each facet had and has to evolve

How ~~did~~ we did it, and do it!

The Route we have followed/developed
The organisation we have evolved.

Way of doing things

- From inception activity fundamentally collaborative
- International
- Inclusive (academia, government, industry, commerce)
- Quality (always sought the best and to work with the best)

1st our way of doing things!
Activities from inception grounded in Collaboration. Naturally drawn to this approach
Profoundly encouraged by Tim Wilkinson our mentor. "International" - second major collaboration with Arbonne.

Inclusive would take the best from anywhere
Never worth doing anything badly
Always pursue quality.

Colleagues: often technically disagreed but never fell out with Joan, Linda and Shirley

Way of doing things (continued)

- Sought good working relations with everyone
 - Colleagues
 - Collaborators (Linda Petzel)
 - Competitors (IMSL)
 - Partners (Albert & Jose-Maria)
 - Project Officers/
Funding Agencies (Agnes Bradier/)

Worked with wonderful people like Albert and Jose-Maria as Partners. Agnes tried to sell me her family farm.

Linda Petzel - taught me about the women's movement in California in the late 70s (Refused to speak to me for a year - and kept to it!)
IMSL - tried to have me excluded from the US. Still good acquaintances

Way of doing things (continued)

Often succeeded; sometimes failed:
constant learning experience

Always tried to analyze the results of decisions made, and recognize their outcome.

We have to live with change - and be constantly learning from our experience.

Way of doing things (continued)

- Aim always to achieve sustainable quality
 - Whatever the working base (often voluntary - collaboratively)
 - Necessitates clearly defined statement of work
 - Standards for completion of product/activity
 - Rigorous enforcement by software tools/peer review
 - Detailed certification process

Pursuit of excellence and of achievable, sustained quality.

Being described by the European Commission (yes - even by them!) as the epitome of quality in software was a great moment.

Way (Route) followed

- Pre-history
 - Algebraic Eigenvalue Solver
 - KDF9 Lib
 - 'Numerical Advisory Desk'
- 'The Great Request and the Bath at Bunny'

Way (Route) followed (continued)

- Numerical Algorithms Library 13 May 1970
- Nottingham Algorithms Group
- Trip with Wilkinson to Ann Arbor and Argonne NL
- Appointment of Steve/
- First Library 30 September 1971
- Marjorie Barritt

Marjorie tried to steal NAL

Way (Route) followed (continued)

- No home in Nottingham
- Invitation and move to Oxford
- Numerical Algorithms Group

Wrote an eigensolver
Showed it Jim
'Good news or bad news?'
Not bad - publishing mine
with Christian in Numerische Mathematik
tomorrow.
Developed KDF9 ^{Numerical} library - for fun
Started Numerical Advisory Desk.
Eric "Please develop a similar
library for the 6A"
No - once fun: twice boring
Then lying in a bath in Bunny in
February 1970 - came the obvious
solution. Develop it collaboratively.
So we met in the Cropp's C.C.
in Nottingham on 13th May 1970.

- very flattering. She spoke for
1 hour 58 minutes at Computer Board.
Leslie Fox and Eric spoke for 2 minutes
We won!

Move to Oxford: 1st August 1973

Additional Slide

This is why we are here!
Each library, and library community had its own character.
And we met some splendid people. For example who can forget Velvo Kahan from Berkeley

Way (Route) followed (continued)

- Components/Numerical Libraries
 - Numerical Algorithms Libraries
 - Level 2 and Level 3 BLAS (Jeremy, Sven)
 - LAPACK (Jeremy, Sven)
 - NAG Library Engine (Gareth, Mick, Mike D)

Needed to get close to the hardware, yet stay portable.

Level 2 - Level 3 BLAS

LAPACK - and Scalapack.

Major technical breakthrough with the NAG Library Engine and XML-based doc.

Way (Route) followed (continued)

- Software Tools
 - Master Library File System →
 - SourceText Management
 - Version Control
 - Software Tools → Internal Tools
 - Toolpack → Toolpack Service
 - Floating-point validation package

Recognized early (1971) the importance of tools

MLFS - major aid to

portability. The rage issue in the 70s!

Meeting at Oak Brook in 75

Lloyd and Lee and Toolpack.

Then the Floating Point Validation Package - to determine machine parameters etc

Way (Route) followed (continued)

- NAGWare f90 Compiler →
 - Fortran Futures '9X
 - Fortran 2003

One of my best moments in NAGs. Malcolm comes in

“I think I can write a compiler for Fortran 90 in 15 months?”

And he did.

Way (Route) followed (continued)

- Graphics and Visualisation
 - Graphical Supplement - Christian, Ken
 - Graphical Library - Ken
 - IRIS Explorer - Jeremy

If any area has proved the value of excellent algorithms it is graphics

The early work of Christian Reusch and Ken Brodlie has gone on, and on and on. They preserved the mathematical properties of the data.

Way (Route) followed (continued)

- Statistics
 - GLIM
 - Genstat → VSNI
 - GLIMPSE
 - STABLE → VSNI

Statistics.

John has given the world such magnificent statistical algorithms and a sound framework.

Pity we didn't have the resources to run with it more effectively until recently.

Good for Stewart and Roger and Alan in VSNI!
Stable is still one of the best ideas Robert and I had.

Way (Route) followed (continued)

- Documentation and Information
 - Printing Manuals (first specification 1970)
 - Microfiche (first 'full' standards manual 1974)
 - On-line documentation
 - Typeset documents (TSSD)
 - Website
 - OpenMath
 - XML-based information

Speaking after Steve I was tempted to start my talk with the comment

'I'm the sort of person who would be bowing at his own funeral!'

Doc. & Info. as a topic can so easily have that effect ← but it is vital. And we have invested in so many ways — up until the present day!

The XML-based information is fundamental to NAG's future

Way (Route) followed (continued)

- Symbolic Maths
 - ~~SENAC~~ (WoCo4)
 - AXIOM
 - Relations with Maple
 - Maple-NAG Connector
 - Teaching Software
 - Mathwise

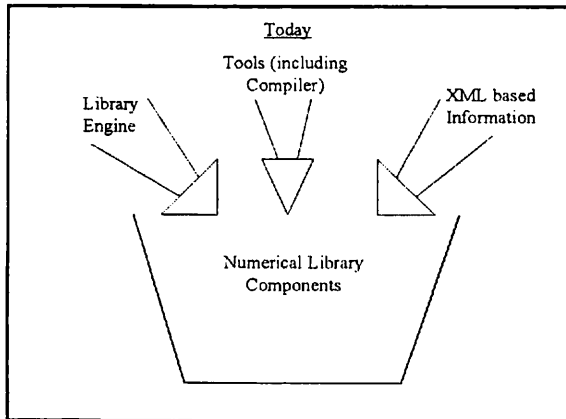
SENAC (Reduce)

Almost good enough!
Still often demanded!

Way (Route) followed (continued)

- Advisory/ Customer Support
 - Error reporting
 - Email support (first use 1977)
 - Help Desk (ubiquitous-middle/late 80s)
 - Response Centre
 - Website

Robert (Des) did our



Mike Hooper, Lisa, Ken.
first Website - and we won
an award for it.

WIkato
Kevin Broggham - ~~WIkato~~, NZ

Axiom - splendid system
Insufficient financial resources
Happy and effective relationship
with Maple.
(Delighted to see Jim Cooper here!)

Need major activity.
Advisory / Customer Support
Services!

One datum: Second user of
email outside Defence in Europe.
(first used in 1977).
Quality of our Help Desk and
Response Centres

Today we have this splendid
ensemble to create
Library Components (and
large collections)

We have a unique working
ability - we must exploit
it!

Way of proceeding (organisation)

- Start-up activity
- Special people: Joan (Walsh)
Linda (Hayes)
Shirley (Lill)
- NAG Project - 13 May 1970

Way of proceeding (organisation) (continued)

- (1976) NAG Limited → Joan, David, Richard
- (1978) NAG Inc → Carol, Jim, Dave,
Rob
- (1990) NAG GmbH → Ute, Christina
- (1994) Nihon NAG → Haruko, Hiro

Way of proceeding (organisation) (continued)

- ICL 1906A
Steve (1971), Nottingham, Oxford
- ICL 1900s
Richard Tallet (1972-2001), Loughborough
- IBM
Margaret (1976), Cambridge

Third topic - organisation

Most fortunate with starting
colleagues Joan, Linda + Shirley
All of us wanted to create a library
to be useful.

None of us were concerned about
our careers, and potential effects
on them!

NAG Limited

Three excellent Chairmen

NAG Inc

The faith of Carol and Brian.

Jim work with us. Dave.

Rob now carrying the torch.

GmbH: Never overcame the
culture/language gap.

Nihon NAG: Imaginative, forceful
leadership from Haruko
and shortly Hiro

Then those wonderful
painstaking Co-ordinators
who brought such structure,
organisation and quality
to our work.

Steve, Richard, Margaret,
John, Geoff, Shah,
Doug and Keith.

Way of proceeding (organisation)
(continued)

- ICL 4100
John Parkinson (1974), Bangor
- ICL System 4
Geoff Hitchins (1974),
Shah, Doug Peksa, Cardiff
- CDC
Keith Fielding (1974), Manchester

Way of proceeding (organisation)
(continued)

- IRIS Explorer Centre for Excellence
University of Leeds
- ~~Use~~ of funded projects
 - Business Partnerships
 - WWNag (1999)
 - BDU (2000)

The Centre of Excellence
in Leeds; ~~and Ken~~
and Jason.

Co-ordinated.

26 projects, at least funded
by the EU.

Created products; built relationships
learn to laugh. Friends all over
Europe. And the wine and food....

Way of proceeding (organisation)
(continued)

Latterly always short of resource/cash
In part due to lack of initial capitatisation

Built Business Partnerships: RES, NPL; ICL
ATT, IBM, Sun

"Remember the complementary dream"?

Intel, AMD, ..

WWNAG

Creating a Group

(rather than a ~~single~~ Starter

Company plus Subsidiaries!)

Business Development Unit

Hard work of a number, but

Jim Reid in particular.

Way of proceeding (organisation)
(continued)

- Spin-Offs/Start Ups
- VSNI (2000) → VSNI/MBI (2003) → !!
- OxDM → failed to achieve funding
- Teleguomic → achieved initial lift-off
administrative receivership
to non-execution by
shareholder/client

Experimented with approach
of Spin Offs and Start Ups.

I believe it is a helpful
additional facet / approach.

VSNI → Winning

OxDM → failed to achieve lift-off

Teleguomic → reached puberty
but then killed by savage
"star person" / multi-national

Future of NAG

- Always grateful for the wonderful colleagues I had in NAG, working in the office and collaboratively in the company
- Starting with Steve, hundreds of them!
- In Rob and Steve's hands, ably supported by Richard and the Council

Thankyou, ~~all~~ equally to all
the people who work for NAG
and I haven't mentioned.

"Read slide!"

Future of NAG (continued)

- What are the dominant paradigms in the market?
- How can we influence, affect, support these?
 - Matlab
 - Spreadsheets
 - Grid
 - 'Do It Yourself'

What of NAG's future
Determined to finish positively
- as we all look to
the future and think
of NAG
- our mutual baby!

Future of NAG (continued)

- Current Installed Base
- Internal/External Runtimes
- Technology Licensing (Supporting ISVs)

Future of NAG

- Problem Solving Environments
(numerical elements)
- Updating Algorithms (“Renewal of TOMS”)
- Standardisation
 - Fortran 2003
 - FFTs?
- Exploiting our new technology
(Library Engine + wrappers)

Future of NAG (continued)

- Enjoyed and Enjoying my life
- Still much to do!
- Made many mistakes -
but got some things right
- Great support from Gill
and Steve, Eleanor, Ian, David,

Future of NAG (continued)

Thank you - all of you

