

Paul Geoffrey HARDY - Curriculum Vitae

Roles:

- **Consultant, presenter, and technical expert on digital mapping and GIS**
 - **Software Project Manager or Product Manager**
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Profile:

I am an experienced and versatile software professional, with particular experience covering software products, digital mapping, GIS, cartography, charting, geospatial data and data models, location services, automated generalisation and data re-engineering techniques. All this is based on my experience of over 40 years at the leading edge of the digital mapping and GIS software industry. I bridge the gap between the technologists and the users, having worked both in software development and in business development.

Skills:

- Consultancy, from strategic analysis and advice, through technical options, platform selection and solution implementation, to performance analysis and problem solving.
 - Design of complete software systems, including customer visits and requirements analysis, through architecture design, implementation planning, to detailed system/module design.
 - Database design and data modelling of object and relational spatial databases, including Oracle and UML, ESRI Geodatabase, and Gothic object database.
 - In-depth knowledge of standard spatial data formats and data models: UK civilian such as OS MasterMap; international (ISO 191xx), open standards like OGC (SF, WMS/WFS/TWSF), European INSPIRE models and national data models like TOP10NL; military like DFAD, DTED and VMAP (VPF/DIGEST); and hydrographic like S57 and DNC.
 - Operation of GIS, database, mapping, charting and graphics software, particularly the Laser-Scan products (LITES2, Gothic LAMPS2, Clarity, Radius Topology), and ESRI products (ArcGIS Desktop and Server), but also MapInfo, Intergraph GeoMedia, Safe FME, Adobe Illustrator, etc.
 - Communication, including giving training courses, dealing with customers at all stages from pre-sales consultancy onwards, and information exchange within a company. I speak fluent French.
 - Software Engineering and Quality Assurance, including implementing software codes of practice.
 - Project management of software projects and combined hardware/software/data projects.
 - Product management, including product definition, implementation planning, progress monitoring, publicity materials, sales aids, etc.
 - Technical and applications programming, with particular strengths in GIS, location services, digital cartography, graphics, object-oriented databases, and VMS systems. Language expertise includes "C", Fortran, SQL, PERL, PostScript, Java, Python, XML, etc.
 - Computer systems management, on Windows and VMS.
 - Advanced use of word processing, spreadsheets, databases, email, raster and vector graphics.
 - Trouble-shooting and problem solving, whether involving software, hardware, data, or procedures.
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Qualifications:

- MA (Hons) Computer Science, Cambridge University, 1975.
 - MBCS (Member of the British Computer Society), 1988.
 - C.Eng (Chartered Engineer), 1990, CITP (Chartered IT Professional), 2004.
 - F.B.Cart.S (Fellow of British Cartographic Society), 2002
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Experience:

Since 2016 I have retired, apart from occasional consultancy.

- **Advising EuroGeographics** on ELF (European Location Framework) status and quality aspects.

From 2008 I worked for ESRI Europe as:

- **Business Development Consultant** – focused on the National Mapping Agency and Cadastral marketplace, being a trusted technical expert.

During 2007, I worked jointly for ESRI UK and ESRI Inc (Redlands California) - as:

- **Technical Solutions Consultant (ESRI UK)** – Advising large customers (governmental and commercial) on best use of GIS and ESRI technology.
- **Cartography Evangelist (ESRI Inc)** – Continuing aspects of the Product manager role described below, particularly the external communication.

I spent 3 years (2003-2006) at ESRI Inc in Redlands California - the market leader in GIS - as:

- **Product Manager for Cartography** – Defining and coordinating a company vision for cartography, acting as evangelist and presenter externally, writing papers and articles, collecting business requirements and translating them into technical requirements for future releases.
- **Software Program Manager for Cartographic Representations** – In parallel, I managed a key software project to engineer advanced cartographic representation capabilities into the core of ArcGIS for the 9.2 release.

Before that I spent 28 years (1975-2003) at Laser-Scan Ltd (now 1Spatial), a world-renowned supplier of leading-edge solutions for digital mapping, charting, GIS, and spatial databases. During this time, I held following roles:

- **Principal Consultant** - Consultant and presenter, providing expertise on the full range of the company's mapping and geodata software products to the benefit of current and future customers. Dissemination of product and industry knowledge within and beyond the company. External clients for consultancy included government agencies like UKHO (the Admiralty), and commercial organisations like the AA (Automobile Association).
- **Chief Product Manager**, coordinating the future direction of the company's mapping and geodata software products, together with dissemination of product and industry knowledge.
- **Expert** on hot topics, e.g., on automated generalisation to derive mapping from base-scale data.
- **Technical Liaison** with major national mapping agencies – OSGB, Military Survey, UKHO.
- **Software Production Manager** with responsibility for turning high-tech spatial software developments into robust, timely, appropriate products for customers. This involved ensuring efficient production procedures, managing product release scheduling, and communicating release contents.
- **Business Development Manager** with responsibility for the Mapping and Charting market, spending much time being an evangelist and presenter for the company's object-oriented mapping technology.
- **Project Leader** or **Project Manager** of many large and small projects (see next section).
- **Chief Programmer** and **Software Architect** for the LAMPS suite of mapping, charting, and geodata software used by prestige customers such as Ordnance Survey, UK Hydrographic Office, the AA, No1 AIDU, George Philips, USGS, etc.
- **Programmer**: I joined the company in 1975, developing the world's first line-following automatic map digitising system.

Projects:

I was project leader or principal agent on many major projects, including:

- Representing ESRI in the ELF (European Location Framework) multinational project to implement and harmonise INSPIRE data models for NMAs across Europe.
- The engineering of advanced cartographic representation capabilities into the core of the ArcGIS 9.2 release, turning an external prototype into standard functionality.
- An aeronautical chart production system, involving single dataset spanning the whole world, and storing multiple temporal states to handle continuous updates and a monthly issue cycle.
- The AGENT project - an EC-funded pan-European project to research and develop radical new capabilities for map generalisation, which led to the creation of agent-based software, capable for the first time of intelligent contextual generalisation.
- A coordinated major release of the company's complete range of current products, including integration of developments, testing, documentation and production.
- Design and implementation of a next-generation mapping and charting production product (LAMPS2), centred on an object-oriented spatial database (Gothic).
- Implementation of a system for scanning, raster editing, and processing of high resolution scanned images of nautical charts.
- Conversion of mapping software to use X-windows interactive graphics with the Motif GUI and

then adding support for PostScript hardcopy.

- Design and implementation of Software Q.A. procedures to meet the requirements of the NATO AQAP-13 specification, and subsequent revision to meet ISO 9000
- Software development of a complete production flowline for military geographical data as part of the Al Yamamah project in Saudi Arabia. This involved data capture and validation of terrain and culture data for flight simulation for Tornado aircraft.
- A transatlantic collaborative project involving map capture and multi-scale map generalisation.
- Software design and implementation of LITES2 - a well-respected interactive cartographic editor, plus integration of relational databases and a user-friendly Motif-based screen menu interface.
- Design and development of a high precision laser plotter, including hardware, software, ergonomics, and visual aspect.
- Transfer of mapping software between platforms, eg PDP11 to VAX, VAX to Alpha, Unix to VMS (and vice versa), Unix to Windows NT.
- Writing of automated vectorisation software using pattern recognition for map data capture.

Education:

- Cambridge University course of Part I "Natural Sciences" Tripos, which gave a wide scientific training, and Part II "Computer Science" Tripos, which gave an intensive overview of computing.
- Secondary education at Kimbolton School, Hunts, gaining 9 'O' levels and 3 'A' levels grade at A.

Publications:

About 50 published papers (single and joint). A full list is at <http://www.pghardy.net/paul/papers/> with on-line copies of most papers. These include:

- "GIS Data Models for INSPIRE and ELF" (Hardy, Lucchi), Data Modelling and Model Driven Implementation of Data Distribution, Copenhagen, Denmark, January 2015.
- "Consistency and Quality of INSPIRE & ELF Data, using GIS Tools" (Hardy, Cary, Lucchi, Hinojosa), Workshop on Spatial Data and Map Quality, Valetta, Malta, January 2015.
- "GIS for 3D Object Generation, Modelling, and Exploitation" (Hardy, Lucchi), EuroSDR 3D workshop, Southampton, UK, November 2014.
- "ArcGIS for INSPIRE" (Hardy), Eurogeographics KEN workshop on INSPIRE, Paris, France, October 2013.
- "Service Oriented Mapping: Maps, Apps, Tools and Subscriptions" (Hardy, Watkins), Symposium on Service-Oriented Mapping, Vienna, Austria, November 2012.
- "Portrayal and Cartography" (Hardy, Field), Chapter 11 of Springer Handbook of GIS, Heidelberg, March 2012. Original available at available at www.springerlink.com.
- "Scaling-up Cartography - Cloud computing and multi-scale content for tomorrow's mapping" (Hardy), ICCG, Nessebar, Bulgaria, June 2010.
- "Specifying Map Requirements for Automated Generalization of Topographic Data" (Stoter, Smaalen, Bakker, Hardy), The Cartographic Journal, October 2009.
- "High-Quality Cartography in a Commodity GIS: Experiences in Development and Deployment" (Hardy), ICA Symposium on Cartography for Central and Eastern Europe, Vienna, February 2009.
- "Topological Constraints, Actions and Reflexes For Generalization By Optimization" (Monnot, Hardy, Lee), International Cartographic Congress, Moscow, August 2007.
- "An Optimization Approach to Constraint-Based Generalization in a Commodity GIS Framework" (Monnot, Hardy, Lee), International Cartographic Congress, Moscow, August 2007.
- "Analyzing and Deriving Geographic Contexts for Generalization" (Lee, Hardy), International Cartographic Congress, Moscow, August 2007.
- "Cartographic Software Capabilities and Data Requirements: Current Status and a Look toward the Future" (Buckley, Hardy), ACSM CAGIS Vol 34, No 2, pp. 155-157, April 2006.
- "Database Driven Cartography - The swisstopo Example" (Neuffer, Schneider, Hardy, Kressmann), GICON, Vienna, July 2006.
- "Database Driven Cartography - The swisstopo Example", GICON, Vienna, July 2006.
- "Cartography: from Drawing to Database (Technology Facilitates Traditional Styles)", Auto-Carto, Vancouver WA, June 2006, revised as "Smarter Symbols: Smarter Maps", GeoTec, Ottawa, June 2006.
- "Design and Experience of Generalization Tools", Auto-Carto, Vancouver WA, June 2006.

- “An Optimization Approach to Constraint-Based Generalization in a Commodity GIS Framework”, ICA WG on Generalization & Multiple Representation, Vancouver WA, June 2006.
- “Putting the Art back into Cartography”, ESRI ArcNews Vol 27 No 4, December 2005.
- “Multiple Representations with Overrides, and their Relationship to DLM/DCM Generalization”, ICA Workshop on Generalization and Multiple Representation, A Coruña, August 2005.
- “Cartography, Database and GIS: Not Enemies, but Allies!”, International Cartographic Congress, A Coruña, August 2005.
- “Database-stored Representations and Overrides, Supporting Automated Cartography with Human Creativity”, Auto-Carto, Las Vegas, March 2005.
- “Clarity - a new environment for Generalisation using Agents, Java, XML and Topology”, ICA workshop on Generalisation, Paris, April 2003.
- “Active Objects and Dynamic Topology for Spatial Data Re-Engineering and Rich Data Modelling”, Dagstuhl 01191, Computational Cartography and Spatial Modelling, May 2001.
- “Mobile Mapping On-Demand - Active Representation and Automated Generalisation of Spatial Databases for the Wireless Handheld Information Appliance”, Society of Cartographers and British Cartographic Society joint symposium, Oxford, September 2000
- “Incremental Updating using the Gothic Versioned Object Database with the Hydrographic S57 ENC and SOTF Spatial Object Transfer Formats”, ISPRS workshop on Versioning, July 2000
- “Integrating Active Objects with Stereo Images for Map Production”, Royal Institution of Chartered Surveyors, Nottingham, September 1999, and at Kartdagar, Gotenberg, March 2000.
- “S57 ECDIS Data Production and Update Using an Object-Oriented Spatial Database”, International Hydrographic ECDIS Conference, Singapore, October 1998.
- “Map Production from an Active Object database, Using Dynamic Representation and Automated Generalisation”, British Cartographic Society Symposium, Keele, September 1998. Republished in The Cartographic Journal vol. 35, no. 2 pp 181-189, December 1998.
- “Stereo Images with Active Objects - Integrating Photogrammetry with an Object database for Map Production”, International Society for Photogrammetry and Remote Sensing (ISPRS), Cambridge, July 1998. Republished as “Map Production with Modern Photogrammetry” in GIM International, vol. 13 no. 1, pp 30-32, January 1999
- “Databases for Cartography and Navigation”, International Cartographic Conference, Stockholm, July 1997 (with PA Woodsford).
- “Object-Orientation, Cartographic Generalisation and Multi-product Databases”, Indian National Cartographic Association, New Delhi, December 1996.
- “Techniques for Update in Raster and Vector Cartography”, International Cartographic Association, Barcelona, September 1995.
- “Quality Assurance and Digital Mapping”, British Cartographic Society, Winter Lectures, 1990.
- “The Laser-Scan FASTRAK Automatic Digitising System”, RICS CLS/CMS Spring 1979.

Status

Married with no children, though we were foster parents for several years.

Interests:

Music (I play English concertina), hiking/rambling, amateur drama, foreign travel, computing, reading, swimming, gardening, photography, learning foreign languages (fluent French, some Spanish and a smattering of Italian and German).

Miscellaneous:

I hold a full British passport and UK and US driving licences. I have had security clearance. I have had an H1B US visa. I have no criminal record. Date of Birth: 20/8/1953.

More Information:

- Telephone 01223 263232, or email paul@paulhardy.net.
- Background information is available at <http://www.paulhardy.net/paul/>
- A tailored c.v. focussed on digital mapping and GIS consultancy is available at http://www.paulhardy.net/paul/pgh_cv4_mapping.html
- Further information on consultancy services is available at <http://www.hardy-systems.co.uk/>

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