

## **Advances in Project Management Series<sup>1</sup>**

# **The map is not the territory: Musings on complexity, people and models**

*By Prof Darren Dalcher  
Director, National Centre for Project Management, UK*

In a recent article, we explored the potential use of a map in enabling decisions and facilitating forward movement and progress, even in a foggy or highly challenging contexts. The point made was that the process of mapping, as opposed to blindly following a map, enables reasoning and adjustments to emerge so that corrections can facilitate improved performance and a more purposeful journey.

*'Indeed, mapping and navigation provide the basis for a journey into less certain and less recognisable terrains, with a general goal or overarching purpose' (Dalcher, 2018; p. 6).*

This article explores the issues related to both maps and mapping in complex and unpredictable terrains.

### **So what is the problem with maps?**

Maps have been in use for centuries. The Oxford Dictionary defines a map as a '*diagrammatic representation of an area of land or sea showing physical features, cities, roads, etc.*', implying that they offer a depiction or a picture of the earth.

Maps are known to represent key facts, often extending beyond location information to feature temperature, rainfall, prosperity, education or any other pertinent facet or feature. Maps are thus utilised to emphasise particular relationships that the cartographers consider to be of interest. Consequently, it is important that the users recognise the intended purpose of a given map and select an appropriate type (e.g. physical, political, geological, climatic, relief, thematic, topographical, economic, resource, road, navigational chart), projection (cylindrical, pseudo-cylindrical, conic, azimuthal, gnomonic, etc.), and scale. In other words, the choice of a map needs to be fit for the observational or navigational purpose and the expected goal.

People utilise maps for many varied reasons, including (Hessler, 2015):

<sup>1</sup>*The PMWJ Advances in Project Management series includes articles by authors of program and project management books published by Gower in the UK and by Routledge publishers worldwide. Each month an introduction to the current article is provided by series editor **Prof Darren Dalcher**, who is also the editor of the Gower/Routledge Advances in Project Management series of books on new and emerging concepts in PM. To see [project management books published by Gower and other Routledge publishers, click here](#). Prof Dalcher's article is an introduction to the invited paper this month in the PMWJ.*

- To find their way
- To assert ownership
- To record human activity
- To establish control
- To encourage settlement
- To plan military campaigns
- To demonstrate political power

While maps have enabled humans to comprehend their surrounding environment, they have also played a critical part in labelling, establishing and claiming power across neighbours, regions and resources. Hessler's list of reasons seems to comprise only a single item focused on guiding the journey. Indeed, Rankin (2016) reasons that maps provide the means for governments to understand, manage and defend their territory, pointing out that during the two world wars maps were produced by the hundreds of millions. Barber and Harper (2010) note that maps use size and beauty to convey messages of status and power, while Monmonier (2010) observes that some maps control behaviour by providing the basis for regulating some activities and prohibiting others (for example, by designating residential zones and locating chemical plants outside cities).

Maps hold immense value, and are often taken to be a rational, unbiased and objective representation of reality. However, Wood (1992) asserts that maps, like photographs, represent a subjective point of view. King (1996) concludes that there can be no such thing as an objective map reproducing a pre-existing reality, as powerful choices will always have to be made about what to represent and how, and what to exclude. Black (2000) affirms that maps are coloured by the political purposes of their makers, therefore arguing that map-making and map-using cannot be divorced from aspects of the politics of representation. Monmonier (2014) maintains that maps lie, and the choices that mapmakers make – either consciously or unconsciously – mean that a map, far from being objective, can present only one version out of the range of possible stories about the places it depicts.

*'Why is Europe at the top half of maps and Africa at the bottom? Although we are accustomed to that convention, it is, in fact, a politically motivated, almost entirely subjective way of depicting a ball spinning in space. As The Power of Projections teaches us, maps do not portray reality, only interpretations of it. To begin with, they are two-dimensional projections of a three-dimensional, spherical Earth. Add to that the fact that every map is made for a purpose and its design tends to reflect that purpose. Finally, a map is often a psychological projection of the historical, political, and cultural values of the cartographer-or of the nation, person or organization for which the map was created.'* (Klinghoffer, 2006, back cover)

In addressing the more technical aspects of map-making, Snyder (1997) concedes that cartographers have been forced to grapple with making a flat representation of an ellipsoid world. The mismatch has resulted in the creation of hundreds of map

projections full of beauty, ingenuity and innovation (Hessler, 2015), and yet, none of the representations has proved to be consistently accurate.

*'As a result of these well-known distortions, many alternative projections to the Mercator projection have been proposed and presented. But none has succeeded perfectly; none is perfectly accurate. Every map is a compromise; each has its own distortions. Navigators must choose which distortion will least affect their travel and thus pose the least danger. Although I know of no mathematical proof that a perfect projection is impossible, 500 years of trying to develop a perfectly accurate projection have not led to success; instead they have led to the acceptance of imperfection—and some disasters—by the navigators of land, sea and air. So, rather than continuing to reject imperfect projections, which would leave us without any map whatever, the imperfect projections have been accepted; and when their use can be defended as better than nothing, they are used with the knowledge of their imperfection.'* (Hammond, 2007; p. 289)

Yet, maps exist precisely because they offer a basic and appealing representation mechanism. Moreover, maps are universal forms of communication, easily understood and appreciated regardless of culture or language (Akerman and Karrow, 2007).

### **Confusing the map with the territory**

The Cambridge English Dictionary defines mapping as the '*activity or process of creating a picture or diagram that represents something*'. The essence of making sense of mapping lies in understanding the distinction and complex relationship between reality, and the human descriptions of the world. If indeed, the descriptions of the world are simpler, or more abstract than the full scale of reality, processes of change, improvement and growth must acknowledge whether they are focusing on, acting on and endeavouring to change 'reality' itself, or a mere simplified, abstracted and limited representation of it.

The map-territory relation refers to the association between the map, as the representational output of the mapping process, and the object being studied, or the actual, physical territory. The distinction draws on the early work of Korzybski (1931; 1933) representing his view that a simplification or an abstraction derived from something is not the thing itself.

*'A map is **not** the territory it represents, but, if correct, it has a **similar structure** to the territory, which accounts for its usefulness'* (Korzybski, 1933; p. 58).

The position acknowledges that when we view a representation, it is far too easy to confuse the model of reality (the map) with the reality itself (the territory). Project managers and business analysts could similarly benefit from reflecting on their object of change. In other words, are we endeavouring to change reality or are we simply acting on our simplified model, whilst ignoring the actuality and complexity of our reality?

Over many generations, traditional maps had been accepted with very limited questioning; reflecting a scientific positivist view of the need to impart and share accepted knowledge. Cartography, the science and art of map-making, thus assumed a direct link between reality and its representation. Harley (1989; p. 4-5) notes that the idea of a map as a 'mirror of nature' leads to some complications, including an assumption of highly confirmed knowledge; ignorance of alternative cultures and dismissal of the truthfulness and objectivity of their maps; and belief that measurement and standardisation lead to a 'true' and increasingly more detailed map.

Early writing by Lewis Carroll introduces the fictional character of a German professor to explain that the mapmakers of Germany had experimented with the use of increasingly larger scale maps, until they reached near perfection:

*"What a useful thing a pocket-map is!" I remarked.*

*"That's another thing we've learned from your Nation," said Mein Herr, "map-making. But we've carried it much further than you. What do you consider the largest map that would be really useful?"*

*"About six inches to the mile."*

*"Only six inches!" exclaimed Mein Herr. "We very soon got to six yards to the mile. Then we tried a hundred yards to the mile. And then came the grandest idea of all! We actually made a map of the country, on the scale of a mile to the mile!"*

*"Have you used it much?" I enquired.*

*"It has never been spread out, yet," said Mein Herr: "the farmers objected: they said it would cover the whole country, and shut out the sunlight! So we now use the country itself, as its own map, and I assure you it does nearly as well." (Carroll, 1893; p. 169)*

Whilst in the extreme, the most accurate map possible would be an exact match and replica of the territory that would clearly be both wasteful and pointless. Some of the implications emerging from the distinction between the artefact and reality, or the map and territory, can be summarised as follows:

- **Objectivity:** Maps are developed through the eye of the observer; they are not objective
- **Relevance:** No map is value free; purpose, values, propaganda and ideology infuse many maps
- **Incompleteness:** A map extracts certain features from reality; it is a simplification and abstraction of reality and as such cannot encompass the full set of characteristics in terms of space, time and complexity of relationships and interactions
- **Accuracy:** Maps only offer a partial and abstracted representation of reality
- **Timeliness:** Traditional maps are temporal, while real life continues to evolve – indeed if we only observe static snapshots in our maps, we can miss the actual flow of life

- **Accuracy:** No map is completely true; Indeed, Brooke-Hitching (2016) even shows that non-existent islands, mountain ranges and civilizations that were presented as facts in maps, were patently wrong, or a mere phantom data
- **Permanence:** Models, representations and maps decay with time, further loosening their fidelity and relationship to real life

The direct implications for project managers are that we come equipped with less than perfect maps of reality; that different sides and stakeholder groups may have their own versions, interpretations and partial representations; and that the models we create and work with, are likely to have serious limitations.

Consequently, two key points emerge:

- Firstly, the map is separate to reality; yet, it can still develop a life of its own outside it.
- Secondly, arguing around the map and scribbling all over it will not change the territory itself. Project managers can become attached to a particular favourite depiction of reality or a specific map, but the changes that they impose, and the new dynamics they introduce will impact the snapshot of the map rather than the territory itself.

### **Completeness versus understandability: Invoking Bonini's paradox**

Reality is far too complex to be conceived as a whole. Maps are often used to capture and simplify the complexity of a real life that is too difficult to glimpse in its full context. Lewis Carroll's German mapmakers, introduced earlier in the article, observed the need to search for higher and higher fidelity in order to capture a true likeness to real life. However, their experience identified that developing models rich in detail and relations, requires ever-bigger models that can rival real life in size and scale.

A model, or a map, is an abstraction of reality, with much of the detail of reality left out. It is some real or imagined thing or process, which behaves similarly to some other thing or process (Harré, 1984). The model represents certain aspects of interest taken from reality. Models and maps embody only the essential features of reality relevant to the investigation and are utilised in explanation, description or prediction.

*'A model is an attempt to represent some segment of reality and explain, in a simplified manner, the way the segment operates'* (Harrison, 1987; p. 95).

Reality is too complex for decision makers and managers to comprehend and replicate. Science proceeds by simplifying reality [Weizenbaum, 1976]. The first step in this process of simplification is the abstraction of crucial details, which also entails leaving out the details or data which are not of interest or do not fit (i.e. stripping of the physical and non-essential features). The choice of aspect and level of detail is a function of the

model builder's perspective, value system and purpose. The utility of a model or map therefore, can only be assessed against these factors.

*'The value of a model lies in its substitutability for the real system for achieving an intended purpose'* (Cleland and King, 1975; p. 135).

Models and maps reproduce parts of reality that are deemed significant. The more detail included, the more difficult the conceptualisation. *"The aim of the model is of course not to reproduce reality in all its complexity. It is rather to capture in a vivid, often formal, way what is essential to understanding some aspect of its structure or behaviour"* [Weizenbaum, 1976]. Essential, implies a purpose and the modeller's mental model is used to select the features of reality that are considered essential to that purpose.

*'Abstraction is the crucial feature of ... knowledge, because in order to compare and to classify the immense variety of shapes, structures, and phenomena around us we cannot take all their features into account, but have to select a few significant ones. Thus, we construct an intellectual map of reality ... Because our representation of reality is so much easier to grasp than reality itself, we tend to confuse the two and to take our concepts and symbols for reality'* (Capra, 1991).

Charles Bonini identifies an essential dilemma in constructing models that fully capture the workings of real life, which has become known as the Bonini Paradox:

*'If our model is to be at all realistic, it will also need to be rather complex, It will in fact be too complex for easy handling by the traditional analytic measures, even after suitable simplifications'* (Bonini, 1963; p. 11).

Complete and comprehensive models and maps are therefore extremely hard to construct and ascertain. Dutton and Starbuck (1971; p. 132) explain that *'as a model of a complex system becomes more complete, it becomes less understandable. Alternatively, as a model grows more realistic, it also becomes just as difficult to understand as the real world processes it represents'*.

Put simply, a model cannot be both comprehensive and fully understandable. Paul Valéry (1937) expresses an analogous sentiment: *'everything simple is false. Everything which is complex is unusable'*.

*'It is of course desirable to work with manageable models which maximize generality, realism, and precision toward the overlapping but not identical goals of understanding, predicting, and modifying nature. But this cannot be done'* (Levins, 1966; p. 422).

Maps and models provide a simplification and a partial distortion of reality. The distortion in the map can later become lazily accepted as a complete and exhaustive synonym of reality, unless we remain alert to the simplification and abstraction that have been utilised.

*'The larger, more detailed and complex the model – the less abstract the abstraction – the smaller the number of people capable of understanding it and the longer it takes for its weaknesses and limitations to be found out.' (Adams, 1995; p. 200)*

The problems we increasingly attend to are complex and interdependent requiring new types of approaches in order to make sense of them and engage with their features and characteristics in meaningful ways.

### A dose of complexity – in search of simplicity

Mathematical and computational models offer limited value in devising improved ways of addressing the inherent complexity of systems that encompass the interaction of people, nature and technology. Indeed, scientific theory offers limited insights into systems, people and their multiple interactions, connections and complex relationships. Yet, if the scientific principles and models are unable to address emergence, complex relations and interaction, where else might we turn to?

Complexity practitioners agitate for the adoption of an alternative worldview that sees the world as essentially interconnected, rich with a diversity of forms and emergent patterns. This month's guest article written by David Bentley, draws on his recent book, *Choosing to Change: an Alternative Understanding of Change Management*, published by Routledge. David has been reflecting on his practice as a change practitioner and on the apparent disconnect between change and unpredictability on the one hand, and our inevitable yearning for stability and order on the other.

David's reflection places individuals, not organisations at the core of change. He is happy to embrace an alternative view of change informed by new insights from the studies of complexity—enabling him to explore how change in organisations is driven by individual choices. Observing that the totality of experiences and aspirations for the future of actors and participants shapes our thinking, in both conscious and unconscious ways, David is able to put together the foundations for a new approach to change, which is informed by individuals and their choices rather than being driven by processes and coercion.

The reflection of those who have experienced change can thus be developed into an informed exploration of how choice can form the basis for successful change journeys. Bentley is then able to draw on the insights in order to propose a new theory based on choosing to change in the face of the unknown and unpredictable. While David is unable to offer an explicit map, he is well positioned to draw upon a far more potent instrument, the power and influence of narrative learning and storytelling. Narratives offer enhanced and directed communication that places people back in the centre of change. Narratives and communication are far more powerful than perspectives focused on machines and prescriptions; they enable change to be adopted as the new normal way of working. Choosing to change can thus overcome resistance and reform change-weary organisations into coalitions of choice in search of improvement, development and growth.

The insights from complexity thinking allow change to emerge from the interaction between people in a continuous fashion, allowing expectations to grow through self-reinforcement. Choosing to change is clearly placed at the core of David's approach and can thereby become a new habit that emerges from and welcomes interaction, communication and informed choice.

### **The future mapping of complexity**

Mapping still has the potential to offer highly prized patterns for improvement; however rather than propose prescription and pre-identified idealised routes, there is a need to accommodate the complex relationship between reality, and human descriptions and understanding of the world. Mapping cannot be undertaken to be a purely physical endeavour as human values, understanding and social and political analysis must play a key part in making sense and deriving the new realities informed by our current explorations.

Turnbull and Watson (1993) suggest that the map is a metaphor not only for the territory it represents but also for the culture that created it. Maps take on the meaning of the territory and its importance in that culture. Cosgrove (1999) notes that the representational processes of mapping have constructed the spaces of modernity since the early Renaissance. Mapping is further evolving as a critical dialogue between research and evolving practice (Dodge et al.; 2011). Rankin (2016) identifies a new emphasis on simplicity, reliability and convenience in place of the old fixation with truth and objectivity. Fields (2004) also observes a reinvigorated interest in techniques and theories related to mapping in the fields of complex systems, theoretical biology and cosmology. Mapping can therefore change its focus to create rather than merely represent, as it seeks to endow new meaning in a postmodern setting (King, 1996).

Cartography can also be viewed not as a science of map making but as a highly socialised and politicised artistic endeavour, which savours the individual and their discourses and practices. This allows maps to evolve from representations of space to a space of representation (Siegert, 2011), Thrower observes that '*cartography, like architecture, has attributes of both a scientific and an artistic pursuit, a dichotomy not satisfactorily reconciled in all presentations*' (2018; p. 1). Maps can then develop a social and political dimension, which will allow them to both relate and realign the world.

Maps increasingly have the potential to become more dynamic, allowing for experimentation and impact assessment of engagement. Indeed, land surveying technology and electronic navigation systems combined with more sophisticated tools can allow for new forms of engagement, exploration and charting from an individual perspective. Meanwhile, current thinking in geography emphasises post-representational perspectives that largely eschew material artefacts, preferring instead to accentuate *mapping* and the practices that bring it into being, thereby encouraging a processual turn fuelled by ethnographic inquiries and approaches (Dodge and Perkins, 2015). Advancing from a representational to a processual perspective allows *mapping* to be viewed as a process of constant re-territorialisation, so that maps are never fully

formed, and can be considered to be transitory, fleeting, contingent and context-dependent (Kitchin and Dodge, 2007).

Projecting into the future, modern perspectives may indeed play a part in blurring the distinction between the map and the terrain allowing for new approaches to discovery and the co-creation of alternatives, preferences and decisions. Extending the analysis and the metaphor, if our maps can be addressed as a dynamic form of communication alongside narrative; mapping may yet be able to transform into a potent pictorial alternative that allows for enduring interaction, engagement and exploration in the face of complexity and can bring together participants and explorers seeking change and improvement. Emerging new approaches such as open source mapping, map hacking and map mash-up can allow activities and stakeholders to engage, interact and co-create as they learn, play, change and improve. Such rapid experimentation and sharing can develop the basis for continually developing a clearer and better informed understanding of the complex territories, relationships and impacts of our actions, and ultimately lead to improved engagement and co-shaping of our change undertakings and dynamic change maps by willing, informed and engaged participants.

## References

- Adams, J. (1995). *Risk*. London: University College London Press.
- Akerman, J. R., & Karrow, R. W. (2007). *Maps: Finding our place in the world*. Chicago: University of Chicago Press.
- Barber, P., & Harper, T. (2010). *Magnificent maps: Power, propaganda and art*. London: British Library.
- Bentley, D. (2018). *Choosing to change: An alternative understanding of change management*, Abingdon: Routledge.
- Black, J. (2000). *Maps and politics*. Chicago: University of Chicago Press.
- Bonini, C. P. (1963). *Simulation of Information and Decision System in the Firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Brooke-Hitching, E. (2016). *The phantom atlas: The greatest myths, lies and blunders in maps*. London: Simon & Schuster.
- Carroll, L., & Furniss, H. (1893/1988). *Sylvie and Bruno Concluded*. London: Macmillan.
- Cleland, D. I., & King, W. R. (1975). *Systems analysis and project management*. New York: McGraw-Hill.
- Cosgrove, D. (1999). *Mappings*. London: Reaktion Books.

Dalcher, D. (2018). Strategy as learning to discover the way forward, *PM World Journal*, 7(1), January 2018, pp. 1-12.

Dodge, M., Kitchin, R., & Perkins, C. (Eds.). (2011). *Rethinking maps: new frontiers in cartographic theory*. New York: Routledge.

Dodge, M., & Perkins, C. (2015). Reflecting on JB Harley's Influence and What He Missed in "Deconstructing the Map". *Cartographica: The International Journal for Geographic Information and Geovisualization*, 50(1), 37-40.

Dutton, J. M., & Starbuck, W. H. (1971). Computer simulation models of human behavior: A history of an intellectual technology. *IEEE Transactions on Systems, Man, and Cybernetics*, (2), 128-171.

Fields, K. (2004). The map is the territory, in 7<sup>th</sup> International Consciousness Reframed Conference, 2004, pp. 7.

Hammond, K. R. (2007). *Beyond rationality: The search for wisdom in a troubled time*. New York: Oxford University Press.

Harley, J. B. (1989). Deconstructing the map. *Cartographica: The international journal for geographic information and geovisualization*, 26(2), 1-20.

Harré, R. (1984). *The philosophies of science*. Oxford: Oxford University Press.

Harrison, E. F. (1987). *The managerial decision-making process*. Boston, MA: Houghton Mifflin.

Hessler, J. (2015) Map: Exploring the world. London: Phaidon Press.

King, G. (1996). *Mapping reality*. New York: St. Martin's Press.

Kitchin, R., & Dodge, M. (2007). Rethinking maps. *Progress in human geography*, 31(3), 331-344.

Klinghoffer, A. J. (2006). *The power of projections: how maps reflect global politics and history*. Westport, CT: Greenwood Publishing Group.

Korzybski, A. (1931). A non-Aristotelian system and its necessity for rigour in mathematics and physics. Paper presented at the American Mathematical Society meeting at New Orleans, *Louisiana meeting of the American Association for the Advancement of Science*, December 28, 1931. Reprinted in *Science and Sanity*, 1933, pp. 747-61.

Korzybski, A. (1933/1958). *Science and sanity: An introduction to non-Aristotelian systems and general semantics*. New York: Institute of General Semantics.

Levins, R. (1966). The strategy of model building in population biology. *American scientist*, 54(4), 421-431.

Monmonier, M. (2010). *No dig, no fly, no go: How maps restrict and control*. University of Chicago Press.

Monmonier, M. (2014). *How to lie with maps*. Chicago: University of Chicago Press.

Rankin, W. (2016). *After the map: cartography, navigation, and the transformation of territory in the twentieth century*. Chicago: University of Chicago Press.

Robinson, A. H. (1952). *The Look of Maps: An Examination*. Madison, WI: University of Wisconsin Press.

Siegert, B. (2011). The map is the territory. *Radical Philosophy*, 169, 13-16.

Snyder, J. P. (1997). *Flattening the earth: two thousand years of map projections*. Chicago: University of Chicago Press.

Starbuck, W. H. (1983). Computer simulation of human behavior. *Systems Research and Behavioral Science*, 28(2), 154-165.

Thrower, N. J. (2018). *Maps and civilization: cartography in culture and society*. Chicago: University of Chicago Press.

Turnbull, D., & Watson, H. (1993). *Maps Are Territories Science is an Atlas: A Portfolio of Exhibits*. Chicago: University of Chicago Press.

Valéry, P. (1937). Notre destin et les lettres. *Journal de l'université des Annales*, 19, 341-354.

Weizenbaum, J. (1976). *Computer power and human reason: From judgment to calculation*. New York: W. H. Freeman

Wood, D., & Fels, J. (1992). *The power of maps*. New York: Guilford Press.

Wood, D. (2010). *Rethinking the power of maps*. New York: Guilford Press.

## About the Author



### **Darren Dalcher, PhD**

Author, Professor, Series Editor

Director, National Centre for Project Management  
United Kingdom



**Darren Dalcher**, Ph.D. HonFAPM, FRSA, FBCS, CITP, FCMI SMIEEE SFHEA is Professor of Project Management, and founder and Director of the National Centre for Project Management (NCPM) in the UK. He has been named by the Association for Project Management (APM) as one of the top 10 “movers and shapers” in project management and was voted Project Magazine’s “Academic of the Year” for his contribution in “integrating and weaving academic work with practice”. Following industrial and consultancy experience in managing IT projects, Professor Dalcher gained his PhD in Software Engineering from King's College, University of London.

Professor Dalcher has written over 200 papers and book chapters on project management and software engineering. He is Editor-in-Chief of *Journal of Software: Evolution and Process*, a leading international software engineering journal. He is the editor of the book series, *Advances in Project Management*, published by Routledge and of the companion series *Fundamentals of Project Management*. Heavily involved in a variety of research projects and subjects, Professor Dalcher has built a reputation as leader and innovator in the areas of practice-based education and reflection in project management. He works with many major industrial and commercial organisations and government bodies.

Darren is an Honorary Fellow of the APM, a Chartered Fellow of the British Computer Society, a Fellow of the Chartered Management Institute, and the Royal Society of Arts, A Senior Member of the Institute of Electrical and Electronic Engineers, a Senior Fellow of the Higher Education Academy and a Member of the Project Management Institute (PMI) and the British Academy of Management. He is a Chartered IT Practitioner. He sits on numerous senior research and professional boards, including The PMI Academic Member Advisory Group, the APM Research Advisory Group, the CMI Academic Council and the APM Group Ethics and Standards Governance Board. He is the Academic Advisor and Consulting Editor for the next APM Body of Knowledge. Prof Dalcher is an academic advisor for the *PM World Journal*. He can be contacted at [darren.dalcher@warwick.ac.uk](mailto:darren.dalcher@warwick.ac.uk).

To view other works by Prof Darren Dalcher, visit his author showcase in the PM World Library at <http://pmworldlibrary.net/authors/darren-dalcher/>.