There is a need for standardised measures that can be used in Orientation and Mobility (O&M) research and practice worldwide. This paper proposes a six step O&M Environmental Complexity Scale. The Scale is founded on an understanding that there is symbiotic interplay between the environment and the people who live in it. Complexity escalates with increases in physical components, pace of movement and social codes, and with a shift from predictability to unpredictability, requiring a higher level of cognition and engagement from the traveller. O&M specialists and researchers are invited to trial the O&M Environmental Complexity Scale, and to contribute to refining this research tool.

Introduction

The need for a standardised environmental rating scale in relation to blind and low vision travel has been identified (Blasch, La Grow, & Penrod, 2008). Such a scale might be used to succinctly indicate the level of travel undertaken by a client during Orientation and Mobility (O&M) intervention. It might serve as a framework for improving travel performance. It could also facilitate O&M research that seeks to demonstrate the effectiveness of O&M services, support O&M funding applications, and evaluate medical interventions such as pharmaceutical treatments, gene therapy, and retinal implants (Dagnelie, 2008).

An environmental scale that is relevant to the wider O&M profession needs to:

- categorise environments succinctly and discretely with minimal interpretation required;
- be applicable anywhere in the world, unlimited by cultural differences;
- serve the needs of the O&M research community;
- be user-friendly.

A conceptual model underpins any measurement (Frytak, 2000). Our ontology, or theory of being, frames the way we understand the environment and therefore the way we approach its scaling. If the environment was a fixed entity, its scale would be somewhat self-evident and would probably not need ongoing negotiation and interpretation. But the environment encountered in O&M is itself a living thing, a dynamic interplay between physical, social, and sensory elements. In order to measure it, we must understand more about this interplay and its implications for the traveller who is blind or has low vision.
Consideration of ontology, O&M practice and notions of complexity leads for the purposes of this study, to a proposed six-step Environmental Complexity Scale and consideration of its application in O&M research and practice.

Body and space

An environmental rating scale and a client performance scale are not the same, however, they are integrally connected. The landscape and the body share a physicality; they both occupy space; they have a specificity of size, shape, and dimension. They each have a history and a future. They inform each other’s identity (Herod, 2011).

According to Leder (1992) for the past four centuries Western thinking has emphasised the individuality of the body, reducing it to its component parts and focusing on mechanical function. O&M practice reinforces this thinking, with its emphasis on independence (Deverell, Taylor, & Prentice, 2009; La Grow & Weessies, 1994). But bodies are not just biological entities; they are, in part, socially produced. The body is ‘a text upon which cultural meanings are projected’ (Herod, 2011, p. 63). Indigenous communities also remind us that we are connected to our ancestors – in spirit and through the learning of lore, then as science shows us, by our DNA (Herod, 2011).

We are also connected to the land; it is integral to the development of our sense of belonging and identity (Tönnies, 1955). Our experiences and our memories are not virtual realities – they are bounded by real space, place, and time. Generic places become ‘action locations’ (Brannock & Golding, 2000, p. 22) as we ascribe meaning to them. Like the body, the landscape is also subject to relations of power. These are manifest in architecture, landscape gardening, public transport infrastructure, and the like.

These notions about being – physicality, power, and interdependence, profoundly influence our thinking about the environment and consideration of scale in the O&M context. Quite apart from natural events such as flood and drought, the environment is subject to human agency. For example, a beautiful Melbourne parkland featuring a large ornamental lake offers refuge for ducks and seekers of solitude, as well as a venue for joggers, sports teams, and families seeking adventure playgrounds. Then for one weekend a year the park is transformed into a manically high-energy Formula One racing venue and the sound of revving engines can be heard more than 20 kilometres away. Thus, a single location can undergo rapid and multiple metamorphoses. Such change affects those who use the location directly, but the impact can also be felt halfway around the world. For example, changes in the land and its use in the Middle East are experienced viscerally in Australia in the grief of those who have lost family members in the conflict, in rising petrol prices affecting the household budget, and in the questionable desirability of Iraq or Afghanistan as a prospective holiday venue. Clearly, how we feel about the landscape, the stories we have heard, the intentions we own, as well as our direct experiences, affect our perception of the environment.

Blasch et al. (2008) have identified a range of factors that impact on travel performance: routes, separate environmental features, weather conditions, direction, sense of safety, boundaries, pedestrian flow, traffic flow and controlled, or uncontrolled intersections. They suggested that the USGA Course Rating System for golf courses might
serve as an effective model for an O&M environmental rating scale. The USGA system has undergone continuous review and modification over the past century and endeavours to embrace the complexity of factors that affect a golf game (United States Golf Association, 2009).

There is a signal difference between golf and the O&M context, though. Golf is a competitive game that sets clearly standardised benchmarks of acceptable performance for each hole and for the game as a whole, in relation to the course. The intention of participation is to measure one’s own skill against these benchmarks, but this approach is antithetical to O&M practice. O&M intervention respects the individual client – her previous experience, her current abilities and her future goals, and works with her in her own context. The underlying intent of O&M intervention is education, not competition or standardisation. There is little to be gained from a normative approach to client O&M performance – in so many cases this approach simply creates unrealistic expectations and exacerbates the person’s sense of disability (Scott, 1969). Our code of ethics calls us, rather, to do everything in our power to reduce the impact of disability (Orientation and Mobility Association of Australasia, 2011). The USGA model should, therefore, be approached with caution as its purpose is quite different to that of O&M.

Measuring O&M performance

Despite attempts, a standardised measure of overall client performance in O&M has not yet been successfully developed. O&M is actually a complex process which cannot be accurately captured with a simplistic measures (Virgili & Rubin, 2006). Some elements of client performance have been measured successfully, for example, walking speed, balance, and timed up-and-go (Clark-Carter, Heyes, & Howarth, 1986; Popescu, et al., 2011). Beggs (1992) found that confidence and the ability to manage anxiety are the defining factors that distinguish poor and elite travel skills. It has been suggested that broader lifestyle scales measuring quality of life, impact of vision impairment, depression and the like, might offer a general indication of the effectiveness of O&M intervention, however, this suggestion has yet to be verified (e.g., Lamoureux, Pallant, Pesudovs, Hassell, & Keeffe, 2006).

As Blasch et al. (2008) observed O&M specialists employ a range of standardised and informal taxonomies and schedules, as well as heuristics in assessing and teaching clients. Heuristic strategies stand in contrast to evidence-based practice drawing on personal experience, reflective practice, input from relevant stakeholders, and common sense to make an evaluation of the unique current context and formulate a response (Merriam-Webster Dictionary, 2011; Webb, 2001).

This approach suits the culture of person-centred practice and the increasingly diverse clientele in O&M. A single, standardised O&M assessment schedule designed for application in all O&M contexts would be either unwieldy in its magnitude, or reductionist of O&M intervention, impinging on and compromising exemplary O&M practice. Its potential impact on O&M specialists and clients seems more onerous than helpful. However, it is perhaps feasible to develop less ambitious schedules and measures targeting specific elements that impact on blind and low vision travel. Environment is one of these elements.
Eliminating more subjective factors

Geographers debate whether scale may be ‘materially manifested in the landscape’ (Herod, 2011, p. xi). Blasch et al. (2008) have investigated the systems used to rate such leisure environments as walking trails, white-water rapids and climbing venues, and noted the subjectivity that plagues such scales, because of the bewildering interface between the environment and the people performing in it. Such client performance considerations as route, difficulty, or safety, are open to individual interpretation and cultural bias. Weaving these factors into an environmental scale makes the scale unnecessarily convoluted and will ultimately weaken its value and usefulness.

Route travel takes place in a particular context, but a route will never be accomplished or experienced in exactly the same way each time it is undertaken. A dynamic environment requires flexibility in the traveller and the capacity to redirect, halt or speed up travel. O&M intervention teaches the client to be responsive to myriad external and internal factors (Weiner, Welsh, & Blasch, 2010). The relative importance of these factors (e.g., traffic noise, rain, fatigue, or hunger) naturally changes each time the client travels a specific route and such constructive responsiveness to the environment is integral to successful travel. Attempts to standardise route travel and control environmental variables for research purposes can undermine or fail to acknowledge the importance of this versatility (Virgili & Rubin, 2006).

Difficulty itself is not inherent in the environment. Difficulty is encountered in praxis – the dynamic relationship between the person, his level of skills, his familiarity with an area, his goals, his social context, and the physical environment. The difficulty encountered in praxis is Vygotsky’s zone of proximal development, the learning space between what a learner can do without help, and what he can achieve with help (Wertsch, 1985). For example, a major department store is an easy place for a seasoned shopper to navigate, but might be overwhelmingly difficult for a three year old child who is lost and distressed.

The importance of safety in O&M is universally acknowledged, but notions of safety are subject to ‘fuzzy thinking and rhetoric’ (Lave, 1987, p. 291). Safety must also be defined in praxis – the calculation of risk based on desired goals, available skills, resources, and perceived dangers. Perception of safety can also be construed from individual fears, which might be quite unrelated to the current circumstances and are by no means universal (Cairns, 2008). An environmental rating scale based on such precarious principles will only ever be subjective.

If we are to identify the elements of the environment that might usefully dictate its scale in relation to O&M, separate from subjective performance elements, it is helpful to take a closer look at the notion of complexity.

Complexity

Complexity implies a complicated whole comprised of interrelated parts, the precise relationship of which is unknown (Merriam-Webster Dictionary, 2011). Urry (2006) identified complexity as a global phenomenon. It is manifest in production, with an exponential increase in components,
processes, and products. It is manifest in ecology, where the ‘effects of humans are subtly and irreversibly woven into the very evolution of landscape’ (p. 112). Nature is not characterised by balance and repose, but by extreme events, variable inputs and disproportionate outcomes. Complexity brings about effects that are different from the sum of its parts, ‘large scale patterns or characteristics emerge from, but are not reducible to, the micro-dynamics of the phenomenon in question’ (p. 113).

We recognise the truth of these statements in O&M, where two clients with the same visual condition never perform in exactly the same way. Factors which contribute to performance differences might include previous experiences, unidentified fears, family context and attitudes but the reasons for such differences cannot be entirely isolated. Conversely, segregating the individual elements that construe the O&M environment (e.g., paving, trees, fences, passers-by) will not necessarily give us a useful indicator of its whole complexity. Perhaps we can develop a sense of scale in relation to O&M environments through broad consideration of the physical components, the degree of movement inherent in the environment at the time of travel, and the social factors involved.

Physical components take form as obstacles and objectives, landmarks and clues in the fabric of both built and natural environments. Layers of structure are built up from two dimensions to three. Components vary in size, shape and contrast, and they overlap and obscure other components, requiring figure-ground discrimination from the traveller (Regan & Beverley, 1984).

The static environment allows the traveller unrestricted time to process information, but the introduction of movement into the environment signifies change and imposes the need for a defined reaction time. Increased speed demands quicker sensory integration by the traveller; delays in reaction time can be fatal (McLean, Anderson, Farmer, Lee, & Brooks, 1994).

The social dimension is the most amorphous environmental factor, comprising tacit codes of behaviour with their intricate cultural differences (e.g., courtesies, body language, gender, expectations, and reactions to disability) as well as more formal codes (e.g., road rules, government acts, and local by-laws).

Scale of the O&M environment only becomes purposeful in relation to O&M travel and there are two principles that seem very relevant in this context. First, an increase in the number of environmental variables signifies greater complexity, requiring more complex sensory processing and greater multi-tasking from the traveller. Second, pattern, order, and predictability are easier to encounter than randomisation and unpredictability (Winkielman, Halberstadt, Fazendeiro, & Catty, 2006). Thus, unpredictability represents an increase in complexity.

A progression of environments, from simple to complex is typically used when teaching the long cane, or introducing road crossing concepts and skills. Working with children who are blind and have multiple disabilities gives a greater appreciation of the degrees of complexity involved in learning. The O&M specialist must understand and break down the task of independent movement into its most basic components to determine whether or not progress in O&M is being, or can be, made by the learner. Reducing background complexity (e.g.,
visual clutter and auditory distractions) facilitates this process, enabling a variety of objects, sensory cues, and movement to be introduced one factor at a time, so that their impact can be understood (Roman-Lantzy, 2007). Learners develop knowledge about each separate factor or skill, constructing this knowledge into an understanding of the world around them (Mettler, 2008; Nielsen, 1992). In O&M, much of this learning is informed by and is integrated with the client’s movement through space, requiring a greater degree of multi-tasking than if the learner remains static.

Consideration of environmental access issues in relation to scooter and wheelchair travel by O&M clients has reinforced the importance of the layering of physical components. For example, half the wheelchair users in the USA are unable to leave their homes without using steps (Kaye, Kang, & LaPlante, 2000). Access to community destinations is often obstructed by inadequate paths and lack of pram-ramps; the scooter user must often ride on the road (Kirschbaum, et al., 2001). Thus, speed becomes an issue. The driving and scooter literature offers us some clarity about the qualitative differences and risks between pedestrian and vehicular environments (Bohensky, Charlton, Odell, & Keeffe, 2008; Nitz, 2008; Walker et al., 2010). It is the increasing pace of the environment (e.g., pedestrian, bike, or car pace) and the myriad ways in which pedestrian and vehicular traffic is managed, rather than the function of the environment (e.g., residential, semi-business, business), that influence the degree of complexity.

It is apparent then, that complexity in O&M environments increases with the layering of physical components, the pace of movement in the environment, and the social codes in play. A quantitative increase in any of these factors, or a shift from predictability to unpredictability can all serve to increase the complexity of the travel environment, requiring a higher level of thinking, analysis, and creativity from the traveller. These factors can be translated into scale.

Environmental Complexity Scale

A six step scale is proposed to classify O&M environments according to their increasing complexity. The notion of scale has its origins in the rungs of a ladder and as such, it is assumed that each step builds on the previous one (Herod, 2011):

1. Static, uni-level environments
2. Static, multi-level environments
3. Dynamic, pedestrian-paced environments
4. Dynamic, crowded, pedestrian-paced environments
5. Dynamic, controlled traffic environments
6. Dynamic, uncontrolled traffic environments

Levels of the Environmental Complexity Scale are described in greater detail:

Level 1. Static, uni-level environments

The ground surface is clear, with any texture (e.g., carpet, gravel, mulch, joins
in concrete, grass) being less than one inch (2.5 cm) in height. Any gradient is gradual rather than abrupt. There are no overhangs (e.g., tree branches, mobiles) which might contact the traveller unexpectedly. The area is clearly bounded (e.g., fence, walls, distinct visual, or tactual shorelines). There is no free movement (e.g., people, animals, or devices), but there may be controlled, predictable moving parts (e.g., hinged door or ceiling fan). For example:

- Indoors – a clear empty room, corridor, foyer, town hall, gymnasium, tunnel, roller skating rink, or stadium with no free or unpredictable movement;
- Outdoors – a clear driveway or backyard area, netball court or empty car park with no obstacles and no free or unpredictable movement.

**Level 2. Static, multi-level environments**

The ground surface is variable and/or there are obstacles present. There are some distinct shorelines, but not necessarily around the perimeter of the area. Gradients may be steep or the ground surface undulating. There is no free movement (e.g., people, animals, devices, or vehicles), but there may be controllable, predictable moving parts. For example:

- Built environment – any indoor (e.g., home, school, work, or leisure venue) or outdoor area (e.g., courtyard, road crossing), providing there is no free or unpredictable movement;
- Natural environment – forest, park, beach, mountains, desert, snow, providing there is no free or unpredictable movement;
- Controlled or predictable moving parts might include hinged doors, escalators, lifts, leaves and branches moving overhead in a steady breeze, waves lapping on the shore of a beach, or steady rain.

**Level 3. Dynamic, pedestrian-paced environments**

There is movement in the environment, even if not constant or close-by (other people, pets, wildlife, traffic), but anything in the pedestrian’s path of travel is moving no faster than jogging speed. There is a clear, continuous path of travel, mostly defined by distinct, accessible shorelines or fixed landmarks. There may be occasional obstacles, but rarely obstructions which require a complete detour. For example:

- Indoors – home, school, work, university, shops, or nursing home with other people moving around;
- Small crowds are effectively managed – isolated queuing areas are cordoned
off (bank, airport check-in counters) or predictable (supermarket checkout);
• Outdoor pedestrian areas – playgrounds, sports grounds, footpaths, or quieter railway stations;
• Outdoor vehicular areas – bike paths, driveways, road crossings, or car parks where vehicles move across the traveller’s path of travel slower than jogging pace (out of courtesy to pedestrians, or because the speed limit is low, there is little turning room, or visibility is poor).

**Level 4. Dynamic, crowded, pedestrian-paced environments**

There is continual movement in the environment, but people, animals, or vehicles are moving no faster than jogging pace. Shorelines and landmarks are repeatedly obscured by moving crowds, obstacles, and obstructions, so there is no clearly defined path of travel. The volume and movement of shifting crowds require continual decision making for way-finding. For example:
• Indoors – a major department store during sales, food court at lunch time or theatre foyer during interval;
• Outdoors – a large scale sporting event or concert, traffic jam, street festival, fairground, or busy community market.

**Level 5. Controlled traffic environments**

Movement in the environment is faster than jogging pace, but is managed or moderated in such a way that the safe time to move between the traffic is distinctly evident. Way-finding is clearly indicated by shorelines, landmarks, clues or road rules (e.g., traveller must take the shortest distance across the road). For example:
• Traffic movement may come from road vehicles (bicycles, cars, trucks, buses, motor bikes) rail transport (trains, trams), water transport (passing ferries, yachts, kayaks), animals (horses) or people (roller blades, skateboards, foot-scooters);
• Low traffic flow – there is hardly any traffic moving in the neighbourhood. There are defined periods when traffic is silent; occasional moving traffic is very visible/audible;
• Effective traffic management systems – traffic lights, zebra crossings, school crossing guards, traffic police, and railway level crossings create an open, continuous path of travel and a defined time when the area ahead is clear to cross (note that, if the infrastructure for these systems is in place but drivers routinely ignore the rules, and the onus is on the pedestrian to make safe time/
distance judgements, then the area rates level 6);

- Infrastructure and landscaping – drivers are prompted to stop for pedestrians by narrow roads, designated crossing points with chicanes or traffic islands, or buildings and vegetation creating poor visibility (note that infrastructure and landscaping can reduce all traffic speed to pedestrian pace, which rates the area at level 3);

- Self-regulation – in some areas, for no apparent reason, drivers routinely stop for pedestrians, and the pedestrian does not have to make time/distance judgements about the approaching speed of traffic relative to the width of the road.

**Level 6. Uncontrolled traffic**

Movement in the environment is faster than jogging pace, and traffic cannot be relied upon to give way to pedestrians. Traffic can vary in direction, flow, volume, pattern, speed, and predictability. The onus is on travellers to analyse the traffic and judge the distance of the area to be crossed, relative to their own skills (e.g., pace of travel, use of mobility aid, reaction time, steadiness of gait, and level of confidence), both before and while proceeding. For example:

- High traffic flow – there is plenty of traffic around, and rarely a time when the traffic is completely quiet. It may be 15 minutes or more between silent gaps in traffic;

- Ineffective traffic management systems – drivers ignore the road rules and systems in place to manage traffic (drive through red lights, block the pedestrian crossing zone). There is no clearly defined space or time to move forward and time/distance judgement is required;

- Silent vehicles – bicycles, hybrid cars, roller blades, and skateboards can be very quiet, making it difficult to judge a gap in traffic using hearing alone.

**Considerations in using the Scale**

Because of the dynamic interplay between people and space, a single location may rate differently at different times. The decision about rating needs to be made at the time when the travel is being undertaken. For example:

A clear front hallway at home may rate at level one during the day while the family is out of the house. But after school when the children drop their bags, toss off their jackets in the hallway and head upstairs, the stationary clutter in the hallway rates the area at level two. At the end of the day, when everyone is home and traversing the hallway periodically, the same space rates at level three. During a party, with music pumping and guests greeting each other exuberantly, mingling, crowding, and blocking access to the stairway or the front door, the space rates at level four because there is no clear path of travel.

It is debatable whether an outdoor market or bazaar attended by thousands of people at pedestrian pace (level four) is less complex.
than a traffic light crossing at a quiet time of day (level five). However, the perception of complexity in these two situations will be heavily influenced by familiarity with the context, individual sensory sensitivities, and the observer’s personal preferences. A person who shops at the market regularly becomes very familiar with the babble of voices and the pungent odours of live chickens and rotting cabbage when bartering with stall-holders; with practice, irrelevant sensory information is screened out. The decision about ordering levels four and five was made on the basis of travel pace, considering increased speed carries an increased risk of harm in the event of collision, requiring quicker reaction time and the synthesis of vehicle traffic codes, not just pedestrian codes.

**Sensory variables**

One option for dealing with such changeable variables as illumination or weather is to ascribe a secondary code (A or B) indicating whether the sensory environment is normal/predictable, or extreme/unpredictable in some way. This decision will depend on what is considered normal or extreme for the particular location in question. For example:

\*A quiet, residential footpath on a cloudy day might rate 3A – a car crosses the footpath as it proceeds up a driveway at pedestrian pace; the light is even and the sound of a lawn-mower or a dog barking is entirely in context. The same location might rate 3B if the footpath has been recently excavated, or a big group of noisy schoolchildren is moving through, or gale force winds arise. But if road works have been underway in that street for nine months and seem likely to continue for another year, the environment would rate 3A unless something unforeseen occurs during travel to warrant a 3B rating.

A busy shopping centre might rate 4A when it manifests the usual sandwich boards, signage, escalators, and hubbub of shoppers. But during sale-time or the pre-Christmas season, the volume of shoppers increases dramatically and the atmosphere changes from retail therapy to retail anxiety and even rage; shoppers move more quickly, changing directions abruptly, and the music volume is increased to add to the hype, rating the area 4B.

It could be assumed than any environment rates A for sensory complexity unless something occurs to change this to B. It may be necessary to travel a route several times before the criteria for normal and extreme in that context are understood.

**Implications for O&M practice**

The simplicity of the Environmental Complexity Scale makes it a readily accessible tool for O&M specialists, clients, and researchers who need a common language to evaluate O&M travel environments. It can be used to sequence O&M action from simple to more complex environmental challenges (e.g., for long cane training or developing road crossing skills). It can also be used to select environments in diverse contexts which rate at the same level on the scale, offering a similar degree of mobility challenge. This will facilitate consolidation and transfer of skills at the client’s current level of competence. When a client is finding a particular environment too challenging,
the Environmental Complexity Scale frames how the task might be simplified.

Using the Environmental Complexity Scale to analyse a travel route can lead to surprising results. On a one kilometre business route, the author found that only one road crossing rated level six on the Scale. Other crossings rated level three or level five, either because of the slow pace of traffic, or the effective traffic systems in place. The busy supermarket car park rated three because the cars moved slowly, giving way to pedestrians. In using the Scale, it is important to avoid standardised assumptions about driver culture and rate the area for environmental complexity at the time of travel. The clearly defined criteria of the Scale prompt us to rethink how we analyse the O&M environment.

While the Environmental Complexity Scale has been designed for use in relation to travel with blindness or low vision, it also has relevance to school or community groups undertaking travel training.

The Scale can be used as a tool to educate O&M ‘outsiders’ about the issues that make travel complex for the person with low vision or blindness. This understanding has implications for those involved in disability access and design of infrastructure, as well as those designing and implementing O&M research.

The mobility tasks undertaken in contrived, controlled laboratory-style courses for the purposes of research seem to bear little relationship to real-world O&M action (e.g., Soong, Lovie-Kitchin, & Brown, 2001). This dilemma raises valid questions about the relevance of such projects in evaluating client performance or real-world O&M interventions (Soong, et al., 2001). The Environmental Complexity Scale offers a language and structure that embraces both laboratory-style environments (often level two or three) and real-world environments (levels one to six), and has the potential to support the extrapolation of findings between laboratory and real-world contexts. The Scale also gives the research community both a prompt and a framework to extend O&M research beyond controlled indoor environments into dynamic, real-world environments where most O&M intervention actually takes place. If the Environmental Complexity Scale seems feasible to the O&M research communities, working groups might develop sub-categories within the Scale that serve the purposes of their specific client populations or research interests. The decisions regarding these subcategories can be tested, explored, and justified by the working groups or within the methodology of individual research projects. The subcategories will have greater validity and reliability if they are developed with global application in mind.

The Environmental Complexity Scale is an excellent foundation on which to build a library of equally specific O&M research tools. Such tools might target core aspects of O&M, such as functional vision, functional hearing, decision making, safety, and confidence.

Conclusion

Blind and low vision mobility is a complex undertaking and despite attempts, there is no standardised measure to evaluate O&M action. An attempt to evaluate all O&M action using a single measure is unlikely to be successful. Such a measure would either take on an unwieldy complexity
and magnitude, rendering it unusable; standardise performance expectations in a way which is ethically questionable and inconsistent with person-centred practice; or simplify O&M action to a degree which fails to capture its nuanced subtleties. O&M measures need to be conceptually consistent with O&M practice if they are to offer validity and reliability to any research undertaken (Frytak, 2000).

Rather than trying to develop a single, comprehensive O&M measure, a preferred approach might be to develop clearly defined measures for individual factors which impact on O&M action. This approach will serve the needs of the O&M research community and enable O&M service providers to demonstrate the effectiveness of their intervention in more detailed and meaningful ways.

The Environmental Complexity Scale is important because it does not attempt to immobilise the O&M context in order to understand it. Instead the Scale recognises the dynamic nature of the environment and the symbiotic interplay between people and context. It has the potential to be a useful tool in O&M research because of its simplicity, but it needs to be subject to validation, trial, and critique by the global O&M community. Once the tool is refined and deemed globally applicable it could be developed in more detail to meet the needs of specific research enquiries and client populations.

The first test is for individual O&M specialists internationally to consider whether or not the Environmental Complexity Scale is effective in capturing the O&M environments with which they are familiar. The author welcomes constructive questions, comments, and suggestions regarding this Scale.

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