Smart SMEs – Market Validation Program Technology Requirement Specifications (TRS)	
TRS Title	Automated Biophony Sensor Stations
Technology area/s	Remote sensors
Host public sector entity	Department of Primary Industries (DPI)
Project description	
Purpose	The purpose of this project is to develop low cost and robust automated biophony sensor stations to auditorially monitor for pests and biodiversity. The sensor stations must be capable of being deployed throughout production orchards and be capable of being networked with data collection managed remotely. Ideally the data would be transferred to a central repository but it could also just be stored locally at the property or enterprise level. Remote management could also entail being able to reprogram sensors remotely rather than having to visit each one and physically reprogram it.
Description of technology need	Biophony is the environmental acoustic signals produced by insects, birds and other organisms. DPI has investigated the use of biophony as a rapid assessment tool that complements the flora-based habitat hectares approach developed by the Department of Sustainability and Environment (DSE). The data generated from acoustics lends itself to reporting the state of the environment in an intuitive yet qualitative way, as well as being a potential marketing tool to demonstrate Australian environmental performance to overseas export markets increasingly demanding environmental credentials. The project has now reached the stage where in order to proceed and reach full implementation, a source of cheap and robust specific sensor stations is required.
Description of proposed solution	The technology requirements include: 1. Sensor capable of recording audible sounds as WAV (Waveform Audio Format) files 2. Programmable to allow various sampling frequencies and on/off times 3. Preferably modular so that other sensor types could be monitored - this section refers to a preference that sensor stations could have multiple sensors such as sound, temperature, relative humidity, light etc so that the biological data could be linked to the physical or meteorological data. 4. Networkable – transmission over at least 100m 5. Energy efficient 6. Ultra compact 7. Weather proof 8. Removable memory card 9. Unobtrusive design 10. Economical 11. Easy to configure and deploy

Proof of Concept Outcomes	A prototype that meets the specs 1,2,4,5,7,8,10 and 11 and a report on reliability.
Keywords	Sensor nodes, Bio-acoustics, Mesh networking
References	This technology is still in its infancy and no commercial solution is available. There are a number of research references but there has been no commercial implementation of this technology. There has been discussion in the research community regarding potential solutions, however, we are confident that no product has yet been developed to suit DPI's needs. *Introduction to sound: Acoustics for the Hearing and Speech Sciences*, 3rd Edition, Charles, E. Speaks 1999 Thomson Delmar Learning ISBN 1-56593-979-4 Baptista and Gaunt 1997 *Bioacoustics as a tool in conservation studies. In: Behavioural approaches to conservation in the wild* (Clemmons and Buchholz eds) Cambridge Univ. Press. P212-242 Chesmore, D. 2004 *Automated bioacoustic identification of species*. An Acad Bras Cienc 76(2) 435-440 Gage, S.H., Napoletano, B., and Cooper, M. 2001. 'Assessment of ecosystem biodiversity and acoustic diversity indices'. *The Journal of the Acoustical Society of America*. 109(5) 2430 Porter et al 2005. 'Wireless Sensor Networks for Ecology'. *Bioscience* 55(7): 561-572 Burmm, H. 2004. 'The impact of environmental noise on song amplitude in a territorial bird'. J*. Animal Ecology* 73, 434-400.
Further information	If you require further information about this TRS, please email the MVP project team at: mvp@diird.vic.gov.au