PCB Assurance - Clarification Questions and Answers

Question	Answer
The competition talks about imaging PCBs in the range of visible and x-ray light. Would the	There is no restriction on the wavelengths to use to image PCBs and the solution can include
Authority consider approaches that use longer wavelengths of electromagnetic energy under	multispectral imaging, provided it can be done safely. The solution to imaging should include a
this challenge?	method to image the internal copper traces of the PCB.
Is the use of ML vision processing in solutions considered mandatory?	The use of ML is not mandatory, all valid approaches to interpreting the images are encouraged
	and assessed equally.
Do we have access to any data / circuit boards / CT scanners / X ray machines, or do we have	CT radiograph and reconstruction volume data of a small number of PCBs can be provided.
to source everything ourselves?	Commercial PCBs with open source design data are also available.
Can we build a computer model in unity to show how this would work in practice or do you	Could you explain more about what you are thinking with building a computer model in unity?
need a physical PoC?	Ideally would like a PoC, though we don't understand enough about the unity approach to give a
	definitive answer.
Is 80k the limit for this work?	For this phase yes. At the end of the phase the work completed will be reviewed against existing
	budget allocations. So there is potential for further funding at a later date.
Can we use off the shelf data processing programs like FME, Hadoop, MATLAB or do we have	In the final application, data processing will preferably be done off-line. While there are no
to build it all from scratch?	limitations to which data processing approach to use, being able to run it off-line will be of
	benefit.
Is there anything we're not allowed to use?	I would like to leave the solution open to not constrain creative ideas. Please feel free to ask
	about anything you think might fall into this category of not allowed.
Do we have test data or test items we know are tempered or are not tampered to use as QA	A small set of CT data and gerber manufacturing data for tampered/not tampered PCBs can be
for the design process.	provided, though other options should be explored first.
What datasets are available for AI modelling? As this is a key limiting factor within the tight	We will not be providing large datasets for AI training purposes, however a small set of CT data
delivery timeframes to developing a sophisticated AI. EG, are there datasets of PCB Xray/CT	and gerber manufacturing data for tampered/not tampered PCBs can be provided.
images linked to CAD files? And if so, what's the rough size of the available data (in terms of	
number of samples)?	
If no datasets are available, this presents an opportunity to deploy a novel imaging	Tracing of copper tracks and their attribution across multi-layered PCBs with a development
technology that we've been developing (redacted). We believe this technology (redacted)	pathway of how this can be applied to populated PCBs to overcome problems should as
has particular relevance for establishing the integrity of copper tracks on a pcb, but the lack	'shadowing' is of interest.
of existing datasets poses a concern for success AI development. Nonetheless, we believe we	
could develop a demonstrator in the timeframes, but this would be on non-populated PCBs	
(with further work then required to upgrade the solution to work on populated PCBs). Would	
this be an acceptable end point for the project?	
What are the dimensions and thickness of the PCB board?	PCB dimensions could be up to 30cm by 20 cm, more likely smaller 15cm x 10 cm. Thickness up to
	2mm but more likely 1mm to 1.5mm.
Which types of X-Ray technology or machines have been attempted?	Micro-focus CT scanning up to 200KeV.
What were the limitations of the existing X-ray technology that was used?	Component's metal artefacts "shadow" images, high barrier to entry on machine cost and user
	training. Can be difficult to manually interpret volume.

What is the minimum size of the copper traces that can be analysed?	Each copper trace could be less than 35um in height, less than 100um in width and a copper clad
	layer less than 150um thick.
How many copper layers are typically found in an assembly, and what is the maximum	A PCB for verification could consist of multiple (potentially 10 or more) layers of copper traces,
number observed?	bonded on to FR4 glass epoxy substrates and laminated together.
What is the closest dielectric separation between copper layers?	Pre-preg thickness between layers minimum would be 50um though likely to be 100um.
Where are the copper traces located within the PCB board?	Traces would be on layers spread through out the PCB stack up. Some layers will be planes of
	copper for power and ground low impedance distribution, while other layers will be signal layers
	with mostly copper traces surrounded copper planes of power and ground for signal and power
	integrity.
While the goal is to focus on an image-based solution can some limited probing take place?	Absolutely, the goal is to determine the tracking layout and if probing benefits the solution
	understanding then yes.
Would we be able to power the PCB board under test?	Yes
Is there an expected limit to the cost of the final system once production ready?	No cost is currently defined to not constrain potential solutions. It is envisaged the system would
	be R&D lab equipment scale.