

A CONSOLIDATED LIST OF QUESTIONS FROM PARTICIPANTS' CONFERENCES AND FOLLOW-UP SESSIONS¹

1.0 Funding, Eligibility & Team Composition

1. Please clarify Clause 16.4 of the MAGIC 2010 guidelines. The way it currently reads, no university team may receive funding whatever the source, which would rule out our entry with a corporate partner. The clause also appears to prohibit university staff or students from participating in an external commercial team.

The organisers anticipate robust industry-academic partnerships working together to field challenge solutions: university staff may compete on external commercial teams and vice versa. Team Sponsors are defined in Clause 16.6 of the MAGIC 2010 Guidelines as “an organisation that contributes labour, materials, services, facilities, equipment or funds to a team.” Subject to Government Funding restrictions (defined in Clauses 16.5 and 16.6), Team Sponsors may provide funding to teams to enable them to participate in this challenge provided the Team Sponsor does not receive direct Government Funding for the specific development of Foreground IP used in the UGV systems.

Section 16.4 **Participation & Sponsorship** should read

Corporations and non-government organisations may participate as teams or as sponsors.

Universities, university research centres, colleges of learning, polytechnics, schools, their employees and graduate and undergraduate students may participate in this competition unless they receive direct funding or support through a grant, contract or other transaction for the purposes of participating in or developing equipment for this challenge from national or state governments, government agencies or other state or federal government organisations. This does not prohibit support or funding provided by the organisers of this challenge.

Teams receiving direct funding or support for this competition from national or state governments, government agencies or other state or federal government organisations are not eligible to participate. However, individuals employed by these agencies or organisations may participate as team members as long as they do so outside their official responsibilities and not as part of some work-related duty or assignment. Government travel funds and government-related travel may not be used to support the challenge team.

¹ It is believed that all of the clarifications contained in this document are consistent with the MAGIC 2010 Rule & Guidelines posted on www.dsto.defence.gov.au/MAGIC2010/. However, in the case of any discrepancy (a) the original Rules & Guideline take precedence, and (b) clarification should be sought.

2. Can you receive assistance from bodies directly funded by the government?

If a non-governmental organisation providing assistance to a team receives government funding that is not targeted toward this competition (i.e. national or state funded university infrastructure), the non-governmental organisation may provide assistance

3. Section 16.4 states “Teams receiving direct funding or support for this competition from national or state governments, government agencies or other state or federal government organisations are not eligible to participate.” Can funding be provided to team members by an economic development corporation that is funded by a state government as well as a portfolio of investments and loans?

Teams will be asked to disclose reasonable details on funding and can be expected to answer questions relating to the source and traceability of funds.

4. Section 16.4 states “Teams receiving direct funding or support for this competition from national or state governments, government agencies or other state or federal government organisations are not eligible to participate.” How does this apply to activities at state-funded universities?

Funding may be provided by State Universities as long as the University does not receive direct funding from a government agency to participate in this challenge.

5. R&D funds: Section 16.5 states “No funding used...has been or will be charged to a grant, contract, or other transaction from any national government, either directly through such work or indirectly through government-reimbursable R&D, government-funded independent R&D, overhead or general and administrative accounts.” Is this referring to government overhead or G&A funds being provided to a contractor, or does this refer to R&D, overhead and G&A funds of a company? That is, if a company earns 100% of its revenue from government contracts, is it not allowed to use any of its own funds to support its participation?

As long as the funding it receives from a government agency is not for the specific purposes of participating in this competition.

6. Are we allowed to work with a government agency if they have already done work in this area?

No. Individuals employed by national or state governments, government agencies or other state or federal government organisations may participate as team members as long as they do so outside their official responsibilities and not as part of some work-related duty or assignment.

7. Universities generally receive funding from the University and through grants ARC for ‘general robotics’ research and not designated for this purpose. Can we use those funds for the purposes of entering this challenge?

Teams receiving funding from their university and/or the ARC for ‘general’ research into robotics are eligible to participate in this challenge. A team that receives direct funding or support from the ARC for the specific purposes of participating in this challenge would not be eligible.

8. The direct government funding, does it preclude working for/with the CSIRO?

The CSIRO is an agency of the Commonwealth Government of Australia and, subject to clause 16.4 above, would therefore be ineligible as a team participant or sponsor. Similarly, teams that receive direct funding or support from the CSIRO for the specific purposes of participating in this challenge would be ineligible. However, in common with other state and national government agencies and organisations, individuals employed by the CSIRO may participate as team members as long as they do so outside their official responsibilities and not as part of some work-related duty or assignment. Government travel funds and government-related travel may not be used to support the challenge team.

9. Can we approach DSTO to collaborate with your researchers?

Individuals employed by DSTO and other national or state governments, government agencies or other state or federal government organisations may participate as team members as long as they do so outside their official responsibilities and not as part of some work-related duty or assignment. Researchers involved in either the organisation or execution of this challenge are not eligible.

10. Are there any limitations on use of previous robotics sub-contractors either from DSTO or other Govt agencies?

Individuals employed by national or state governments, government agencies or other state or federal government organisations at any time during the period between 1 July 2009 and 8 November 2010 (i.e. between announcement and challenge event) may not participate as team members unless they do so outside their official responsibilities and not as part of some work-related duty or assignment. If the contractors have been but are no longer employed by a government agency these restrictions do not apply.

11. Are there any limitations to the amount of cash or in kind support that a team can raise and use to support their entry to this competition?

There are no limits to the amount of cash or resources that a team may raise/use in order to compete. There are restrictions on the source and nature of funding arrangements. These are explained in Section 16 ‘Eligibility’ of the MAGIC 2010 Guidelines and clarified below. Down-selected teams should be prepared to answer reasonable questions relating to funding, support and resources.

12. On the issue of funding, if we have an offer from a sponsor to (say) make t-shirts with a sponsor's logo on the back, with the sponsor providing us with \$2,000 for travel, is that allowed?

As long as the sponsor is not a national or state government, government agency or other state or federal government organisation this proposal would be legitimate.

13. If I have taken part in UK MOD grand challenge can I compete in this challenge?

Participation in previous challenges does not preclude participation in this one.

14. What is the ideal construct of a team with regards to Academia/Industry?

The organisers have no opinion on the ideal team composition.

15. Must a team submit a Registration of Interest to participate in the event?

Submitting a Registration of Interest (also known as Intent to Compete) form is not a prerequisite for participation in the challenge, but it is requested. To compete, teams must submit a Technical Submission, the details and format for which is available from www.dsto.defence.gov.au/MAGIC2010/.

16. By what date is the Registration of Interest due?

All Registration of Interest forms should be submitted electronically to MAGIC2010@dsto.defence.gov.au by 4 September 2009. All Technical Submissions must be sent electronically to the same address by 23:59 GMT on 2 October 2009. No late submissions will be accepted.

17. Can teams change team composition during initial submission after submitting an Intention to Compete form in August? Can teams change team members after submitting the MAGIC 2010 application form?

Teams may change composition in any way they wish up to the point that they submit a team roster with their technical proposal (i.e. 2 October 2009). The team roster may change after 2 October, but organisers must be informed in writing that this has occurred. The team leadership and operations and support team membership may not be changed after June 2010, except in exceptional circumstances and with the written permission of organisers.

18. Can teams excluded from the ten-team down-select combine with selected teams to enhance the selected team effort?

It is permissible for teams that do not qualify as semi-finalists to join with those that do, but this may only occur up until June 2010 (site visits). Organisers must be notified of all such changes to team structures and membership in writing.

19. Is it possible for teams to share equipment?

A team 'cartel' is not permitted. Consequently, teams should not plan to share equipment as permission is unlikely to be granted unless it can clearly be demonstrated that one team has malfunctioning equipment and another is assisting them without favour. Under these circumstances, teams may share small quantities of equipment if they first secure agreement from the judges. It may be anticipated that judges will only permit the sharing of equipment at the 'module' level (e.g. a camera, modem or GPS unit that has ceased to function may be borrowed 'one-for-one' from another team).

2.0 Down Selection

1. When the TAP down-selects the ten teams in October 2009, how much emphasis will be placed on the foreground technical detail vs. the background IP and research that a company/team already possesses?

The evaluation of the initial submissions will be in accordance with Section 14 of the MAGIC 2010 guidelines. Equal weight will be given to each of the five criteria.

2. What should the video in the initial submission contain? Length?

The video should show a team's existing research programs and technologies as they pertain to the challenge, autonomous ground vehicles, or automation more generally. Teams might choose to show off programs relating to ground vehicle design, multi-UGV autonomy and coordination, signal, sensor and image processing, data and information fusion, navigation and mapping and human-machine interfaces. Videos should last no more than 20 minutes.

3. How long should the initial written submission be?

Details for initial submissions are provided in Section 13 - "Guidelines for Submission." The technical proposal should not exceed 15 pages. The submission should also include: a written summary (not exceeding 5 pages) that outlines the source of resources, budget, sponsorship (if applicable), team composition (organisations), personnel and experience, and facilities; a video showing current research projects; a certificate of Team Funding & Support, a site Visit Liability Statement; and a Team Roster.

4. Can a team still participate and fund their efforts if they don't make the final ten?

Only the ten teams down-selected in October 2009 will be permitted to compete for the final five places that participate in the final challenge. Only the five teams down-selected in June 2010 will have the opportunity to compete in the final challenge.

3.0 Neutralisation & UGV Attrition

1. What is the exact process for neutralising mobile OOI?

The process for neutralising mobile OOI is as follows:

Having detected, located and tracked a mobile OOI, the detecting sensor UGV should then autonomously cross-cue a second sensor UGV (autonomously will score more points than through the use of human-intervention) to detect, locate and track the motion of a mobile OOI. Once both UGVs are able to simultaneously view and track the mobile OOI, based on the current, likely and potential motion of the OOI, the local challenge infrastructure, and other considerations such as potential workload the lead operator may take the decision to neutralise the OOI. The lead operator must then clearly and correctly identify the location of the mobile OOI to judges and request that the OOI be neutralised. Once judges have verified viewing and tracking of OOI by both UGVs, they will announce start of neutralisation period. The OOI must then be continuously viewed and tracked by both UGVs for a period of 15 seconds. If this operation is carried out successfully the judges will announce that the OOI has been neutralised.

If the neutralisation process is interrupted for any reason the 15 second tracking period will be re-started from zero when the lead operator once again requests neutralisation in accordance with the above process. The two most likely causes of interruption include: (i) one of the two UGVs ceases to be able to track the OOI, although a hand-over process to other UGVs is permissible so long as the simultaneous tracking by two UGVs is continuous and uninterrupted (and announced by the team leader); and, (ii) a non-combatant enters the 10m diameter lethality zone of the mobile OOI and the team lead operator decides to abort the neutralisation process.

If a non-combatant is within the Lethality Zone of the OOI (10m diameter) at the point of neutralisation (i.e. at the end of the 15 sec tracking period) the non-combatant will also be deemed to have been neutralised and teams will be heavily penalised.

The decision to neutralise mobile OOI must be executed by the team's lead operator. The decision to neutralise static OOI may be autonomous or made by a human.

If a decision is made to abort a neutralisation once it is underway, the lead operator must clearly announce "abort neutralisation" to the judges. The abort command must be given prior to the point of neutralisation (i.e. at the end of the 15 second neutralisation period).

2. How far apart must any non-combatants and the mobile OOI be when the mobile OOI is neutralised?

A non-combatant must be outside the 10m diameter Lethality Zone of the OOI at the point of neutralisation (i.e. at the end of the 15 sec tracking period), otherwise the non-combatant will also be deemed to have been neutralised. Teams will be heavily penalised for the neutralisation of non-combatants.

3. How far from a mobile OOI must the UGVs be when the mobile OOI is neutralised?

There is no maximum range at which mobile OOI may be classified and neutralised. The only limitation is the ability of the UGV sensors to detect, classify, track and locate the mobile OOI.

4. What degree of accuracy is required to successfully locate/neutralise a mobile OOI?
Is the simulated UAV data feed position sufficiently accurate to provide this data?

The coordinates of the outdoor mobile OOI provided by the simulated UAV feed are sufficiently accurate for teams to locate and neutralise mobile OOI. However, UGVs must be able to successfully view and track these OOI to successfully neutralise them. Stationary humanoid ('mobile') OOI inside buildings must be located to within an accuracy of +/-0.5m.

5. As the mobile OOI is moving must the position be called out at regular intervals?

It is not a requirement for the lead operator to call out mobile OOI coordinates on a continuous basis, but this is not forbidden either. However, it is necessary for teams to adequately demonstrate to judges that the requisite number of sensor UGVs are able to continuously and simultaneously view and track the mobile OOI throughout the neutralisation period. As mobile OOI may stop, turn, about face, reverse or continue manoeuvring any changes in OOI direction of travel should be accommodated by the UGV viewing and tracking solutions. Position call-outs by the lead operator may assist judges in verifying simultaneous viewing and tracking solutions in some situations.

6. What will happen to a mobile OOI or non-combatant if they are neutralised?

If mobile OOI or non-combatants are neutralised the judges will instruct them to take no further part in the challenge: they will remain stationary and effectively become obstacles. At the end of the phase they will leave the area. If judges (who are also non-combatants) are neutralised they will continue to execute their judicial functions.

7. How do the UGVs neutralise mobile OOI inside a building?

All humans inside buildings ('mobile' OOI) will be stationary. They should be positively identified and accurately located; they may not be neutralised.

8. Will the minimum UGV team size system be guaranteed to be affected by sniper fire?

Regardless of the number of UGVs in a team, at least one UGV will be lost to sniper fire. Sniper activity will not be conducted in a manner proportional to the size of a UGV team. The activity will be spatially and temporally consistent across all teams, regardless of the number of UGVs operating.

9. Will the UGV lost to sniper fire be a sensor or disruptor? Can we lose more than one?

At least one UGV will be lost to sniper fire, which could be of either sensor or disruptor configuration.

10. Will the mobile OOIs react to the UGVs? Can they hear or see them?

Mobile OOIs will manoeuvre without the ability to detect or react to UGVs. Consistency and fairness with respect to their perceived 'random' or 'unpredictable' movement will be maintained across the teams. If a UGV enters the lethality zone of a mobile OOI, the mobile OOI will react to avoid collision with the frozen UGV for safety purposes.

11. Is there any point in choosing electric over petrol because of the noise consideration?

There are no noise considerations beyond those pertaining to normal internal combustion engine hearing protection guidelines for occupational health & safety.

12. Can the decision to neutralise OOI be autonomous or human, and can you stop the neutralisation process once it has begun?

The decision to neutralise mobile OOI must be announced by the lead operator. The decision to neutralise static OOI may be autonomous or human. The process for mobile OOI can be interrupted for any reason if the lead operator clearly requests the judges to abort the neutralisation process or if one of the two UGVs fails to continuously track the mobile OOI throughout the neutralisation period. The neutralisation process for a static OOI may be interrupted by aborting the laser designation of the OOI prior to the 30 second limit.

13. Will the number of UGVs frozen depend on the size of the team?

The number of UGVs frozen depends upon the nature of their interaction with the OOI, not the number participating in the challenge. Sniper activity and the number and nature of OOIs deployed will not be proportional to the number of UGVs in a team. The activity will be spatially and temporally consistent across all teams, regardless of the number of UGVs they operate.

14. Do you need to have two disruptors in case one is sniped and put out of action?

If a team has only one disruptor UGV and it is lost then they can no longer demonstrate static OOI neutralisation (without electing to sacrifice a sensor UGV and risking non-combatant neutralisation) and will potentially reduce the team's ability to generate points. Loss of vehicles should be considered in the make-up of a team's UGV cooperative.

15. If the sniper takes out the disruptor UGV, can a sensor UGV take on the role of the disruptor UGV?

Sensor UGVs may not be re-configured as disruptor UGVs (or vice versa), either during or at the end of a phase.

16. Can the neutralisation process be paused?

The neutralisation process may be interrupted by the lead operator for any reason during the 15 second tracking period. If a lead operator decides to abort a neutralisation once it is underway, the lead operator must clearly announce “abort neutralisation” to the judges. The abort command must be given prior to the point of neutralisation (end of the 15 second neutralisation period). If the neutralisation is interrupted the entire process must then be re-started (from the beginning) once two UGVs are again able to simultaneously view the mobile OOI and the lead operator has clearly and correctly identified the new location of the OOI to judges and requested that it be neutralised.

17. Are disruptor robots destroyed when they disable a static object of interest?

If a disruptor UGV successfully neutralises a static OOI and the OOI is not activated while the disruptor UGV is within its 20m lethality zone, the disruptor UGV will not be damaged. A successful neutralisation of a static OOI does not activate it.

18. Can disruptor robots be destroyed by static OOI?

Any UGV within the 20m diameter lethality zone of a static OOI if/when it is activated will be destroyed. This includes disruptor UGVs. A successful neutralisation of a static OOI does not activate it.

19. Can we assume that an OOI inside or around the corner of a building is not within lethal range of the doorway/corner? Do we need something to look around corners?

Circumstances could exist whereby a UGV enters the activation or lethality zone of an OOI that is ‘out of sight’ or ‘around the corner’. Organisers will ensure that such circumstances do not occur in the first two phases in relation to static OOI. The last phase will not exclude this situation from occurring. However, there will always be line of sight to static OOI prior to entry into their activation zone from at least one accessible perspective. Organisers cannot guarantee that the relative motion/interaction of mobile OOI and a team’s UGVs are timed such that they will never meet around corners in this way.

20. Can we place/push a sensor or other subsystem into a room without risking the entire UGV being destroyed?

UGVs may safely release static or mobile (‘marsupial’) sensors or other modules (e.g. radio relay) throughout the challenge area. This includes the inside of buildings. However, these systems or sub-systems will interact with OOI in the same way as UGVs. The

destruction of a remotely deployed sensor or marsupial UGV will not affect the 'host' UGV unless it too is within the lethality zone of a detonating OOI.

21. Is ground truth determined based on a single RF ID tag irrespective of the dimensions of the vehicle? Will this be placed near to the centre of the vehicle?

Adjudication on the interaction between OOI and UGVs will be on the basis of the location of the OOI relative to the phase centre of the antenna of the RF tag placed on the UGV by judges/organisers to determine ground truth. Teams can anticipate that this tag will be placed near the centre of their UGVs (and/or remote sensors). Differences in position between the RF ID antenna and the UGV computed centre of position will be calculated and considered by the evaluation team.

22. In relation to the rule about non-combatants being within the 10m lethality zone of a mobile OOI at the end of the neutralization process is it presumed that the non-combatant would get caught in the cross fire or something?

The UGVs will not be weaponised. The rule requiring non-combatants to be outside the 10m lethality zone at the end of the neutralisation process is intended to force teams to demonstrate their UGV collective's ability to discriminate between targets and sequence and time actions with respect to unpredictable moving entities.

23. Are there any such concerns for static OOI?

There are no such concerns for successful neutralisation of static OOI. In the event that a static OOI is detonated by a UGV entering its activation zone, any objects (UGVs, sensors, mobile or static OOI, or non-combatants) will be neutralised.

24. In the MAGIC 2010 guidelines, Additional Information point 12.17 refers to a 20sec neutralization process for mobile OOI, whereas the Rule 10.11 refers to this period as 15 secs. Which takes priority?

This is a typographic error. The neutralisation process for mobile OOI takes 15 seconds.

4.0 Challenge Data

1. When will the map and other challenge data be provided?

The down-selected teams will be provided with:

December 2009

- Detailed signatures of the mobile and static OOI. These will be in the form of high resolution imagery (*.JPG files) from multiple perspectives, and will also include material composition, shapes, colour and dimensions of the OOI. The images of static OOI will typically be suitcases, backpacks, high-contrast discs or plates. The images of mobile OOI, non-combatants and judges will be discriminated by the colour-coding of their clothes.
- A representative layout of the area depicting open, restricted and wooded areas, street and road layout, general topography, the location, number, and area of buildings, etc.
- The judging and evaluation criteria for challenge operations.
- Detailed instructions for the conduct of the demonstrations to be held during the June 2010 site visits (will include opportunity to test systems with the UAV feed).
- The simulated UAV (RF tag) data format in WGS84 coordinate system
- Detailed spectrum information on the RF tags (to avoid EMI/EMC)

June 2010

- A range of objects and infrastructure that teams will be required to identify and locate (human intervention for this process will not be penalised). This list of static objects will include road surfaces, paths, buildings, doors, furniture, trees, grass, sandy ground, holes, manholes, safety barriers, fences, vehicles, and other obstacles that teams will need to accurately identify and locate and encode into their maps as metadata. This will be in the form of high resolution imagery.
- The simulated UAV feed will be ready for teams to test with their GCS

November 2010 (during the challenge)

- Precise data and coordinates in formats previously described to teams. This will take the form of a map of the area in *.JPG format with specified dpi resolution and taken from a known altitude (the resolution and altitude information will be provided in June 2010). The data will contain geo-referenced latitude, longitude and altitude coordinates in the WGS84 coordinate reference system with accuracy better than 50cm. The information will be contained on a USB 2.0 flash drive and will be handed to the teams on the day of their participation.

In relation to the data provided during the pre-brief, all vehicles, computers, and software systems must be configured to allow automatic pre-processing of any data without the need for human-inspection of the data. The data may be copied from the flash drive onto team computers and/or disseminated among the vehicles. Thereafter, data must not be removed from the challenge site and all computers, flash drives, and vehicles onto which the data has been copied must remain on site.

2. Where can I find information about the indoor requirements?

Operations inside buildings will be conducted on the ground floor alone. The UGVs do not need to negotiate steps, stairs, lifts/elevators, etc. Access to buildings will be through open doors at least 0.9m wide. There will be no need for doors to be opened by the UGVs or for them to manipulate door handles, light switches, etc. Some buildings will have windows, but access through them will not be possible or necessary.

The buildings will be well lit (minimum 100 lux) and teams can expect most buildings to have multiple light sources. If the lighting conditions inside any building fall below the threshold, teams will be given the option of having the challenge time stopped until a suitable lighting repair is affected.

Further information on the challenge area will be released to the down-selected teams in December 2009, June 2010 and during the pre-brief. The buildings will have concrete floors and will be well lit using multiple light sources.

3. How will the map of the area be provided? How accurate will it be?

The map of the area will be provided to teams during the in-brief immediately prior to their challenge participation. The map will be provided as a *.JPG file with specified dpi resolution and taken from a known altitude (the resolution and altitude information will be provided in June 2010). The data will contain geo-referenced latitude, longitude and altitude coordinates in the WGS84 coordinate reference system with accuracy better than 50cm. The information will be contained on a USB 2.0 flash drive.

4. With the identification of furniture inside the buildings, will it be box furniture or such things as a tables, chairs, desks, cupboards, sofas, etc?

There will be a range of infrastructure inside buildings. Teams may anticipate that it will have the properties of an obstacle and will be included in the list/lexicon of objects and images provided to teams by the organisers. Objects will be simple rather than a complex. As a result, UGVs will only need to search around the base of the objects, not in, on, or under them. If the object is placed against a wall the UGVs need not search behind it.

5. Will the GPS environment be normal?

GPS is expected to be continuously available within the GCS/Operations Area and at the Designated Starting Line (DSL) and Designated Servicing Zones (DSZ). GPS will also be available within the challenge area, but subject to the naturally occurring physical restrictions and environmental conditions imposed by buildings, trees, etc. No GPS signals will be relayed inside buildings. Organisers will make no attempt to disrupt GPS.

6. Will imagery of the objects we are expected to map be provided?

Outdoor, high resolution imagery will be provided. Indoor imagery will not be provided. High resolution images of both mobile and static OOI will be provided to teams in *.JPG format in December 2009. Images of static objects pertaining to the metadata that teams are expected to encode into their maps (e.g. road surfaces, paths, buildings, doors, furniture, trees, grass, sandy ground, trenches, holes, manholes, safety barriers, fences, obstacles, etc) will be provided in June 2010. Teams will also be provided with a list of the sort of the objects they are expected to map and encode as metadata.

7. Is the ground control station a long way from the UGV operation area?

The entire challenge site is about 500m x 500m. The operations area containing the team's ground control station (GCS) is within this site.

8. Do the buildings contain furniture/doors? What information will be provided about the infrastructure?

Buildings will be accessible via open doors at least 0.9m wide. Some of the buildings may contain infrastructure which includes furniture. High resolution imagery of typical infrastructure will be provided to teams in a *.JPG format June 2010, together with a list of the objects that are expected to be mapped and encoded as metadata.

9. Can we have the coordinates of the DSZ? Where are the designated zones?

Precise coordinates, together with data relating to the location of challenge infrastructure, will be provided to teams during the in-brief. The DSZ and operator zones will have dimensions about 30m x 30m and will be located within the 500m x 500m challenge area and within line of site of each other.

10. How many stories will the buildings have? Will the robots need to access the second floor? Will the robots have to travel up stairs?

Only the ground floor of buildings need be accessed by the UGVs. The UGVs need not negotiate steps, stairs, ladders, lifts, or elevators. There will be ramps for any access points that require them.

11. Will the location of the building entrances be provided?

Teams will be provided with information relating to all access points to buildings during their in-brief. However, this information may not be entirely accurate as some doors may not be open. The UGVs will not be able to open or pass through these closed doors, they must simply find another (open) access point.

12. Will static OOI be placed on walls, second floors, etc?

Static OOI will be placed 'in plain sight' on the ground or on the floor inside buildings. They will not be placed on top of, under or inside other objects.

13. What kind of data will be provided to allow identification of the OOI?

High resolution EO images of the OOI will be provided in *.JPG format from multiple perspectives, together with material composition, shape, colour and dimensions of the OOI. If further signatures are required, this may be 'negotiated' with organisers after the down-select. All signatures and information will be made available to all teams.

14. Are commercial data sources (e.g. maps) allowed?

If data is freely or commercially available to all participants teams may make use of it.

15. Will the UAV's provide all the locations of the mobile OOI?

Mobile OOI that are judged to be occluded from an overhead view (e.g. under the arbour of a tree or beneath the eave of a building) will not be provided.

16. What kind of transition may be expected from the outdoors to the inside of a building? Will a robot need to climb a sidewalk, or steps, to enter a building? Will there be ramps? What kind of access will buildings have from the ground? When entering a door, will the door frame be flat with the ground? Will the building have doors that may need to be opened?

Access to all buildings will be through open doors. The UGVs will not need to find and manipulate door handles. Doors that are closed should not be opened. It will not be necessary for the UGVs to negotiate steps or stairs to complete the challenge. Consequently, access to or egress from buildings will not require the UGVs to negotiate major discontinuous obstacles (either up or down). Furthermore, wherever such obstacles do occur the organisers will place ramps. Throughout the course there may be 'minor' (i.e. < 10cm) obstacles such as curbs, transitions from one type of terrain to another, or door-frames that are not fully flush with the ground. It will be essential for the UGVs to negotiate these lesser obstacles.

17. Will the buildings be well-lit inside?

All buildings will be adequately lit with multiple light sources. Lighting conditions inside buildings are expected to be brighter than 100lux [TBC].

18. Would we need to find and flip a light switch?

The UGVs will not need to find and flip a light switch. All buildings will be adequately lit with multiple light sources.

19. Will the buildings have windows? Can the UGVs access buildings through the windows?

Some buildings will have windows. Access to all buildings will be through open doors. Access through windows will not be necessary or permitted.

20. Are we permitted to connect to the GCS to the internet?

If teams see value in connecting their GCS or their UGVs to the internet they may do so. However, organisers will not be providing infrastructure that enables teams to connect to the internet. Consequently, the means by which teams connect and/or protect themselves against 'cyber attack' is their own responsibility.

5.0 OOI Signatures & Information

1. Will the static OOIs always be located on the ground?

All static OOI will be placed on the ground. They will not be placed on, behind or under infrastructure.

2. Will the data you provide on the OOIs be one image or multiple images/point cloud?

Several high resolution images of the OOI from multiple perspectives, the material composition, shape, colour and dimensions of the OOI will also be provided. If requested, other data and formats will be considered following discussions with teams, but all data will be made available to all teams via the website.

3. Could there be mobile OOIs that we are not given?

Teams will be given complete information relative to the nature, behaviour and appearance of the OOI. Teams will not be expected to find OOI for which they do not have appropriate signatures.

4. Can mobile OOI be added at random times and positions in the field? In what fashion are these mobile OOIs going to be added? Are they going to be guys jumping from the barriers into the field? Will the number of OOIs be similar at the beginning and for the duration of the phase?

The number of mobile and static OOI will remain constant throughout each phase. They will not appear from or disappear into any challenge infrastructure, nor will they cross phase boundaries. They will start moving on a judge's instructions at the commencement of each phase and continue manoeuvring until they are neutralised or the phase ends. Mobile OOI may move to occluded positions where their position will no longer be visible to (and hence transmitted by) the simulated UAV feed. Once mobile OOI move out of occlusion their signal will once again be accurately transmitted to the teams.

5. Is there a maximum speed for the manoeuvre of the OOIs?

Mobile OOI may manoeuvre 'unpredictably' at up to 6km/hr. They may stop, turn, about face, reverse or continue manoeuvring.

6. Will the mobile OOI actively move away from the disruptor UGVs? Will they flee the area? Before we aim our cross-hair onto it, will it try and hide behind a tree?

During their manoeuvring, which may appear 'unpredictable' or 'random' to teams, line of sight between the UGVs and the mobile OOI may be broken by challenge infrastructure. However, the mobile OOIs will not react or respond to the presence of the UGVs. They will not be 'intelligently evasive' and will not intentionally hide in, behind, or under

challenge infrastructure. The OOI will not cross phase boundaries or enter/leave buildings.

7. Could a mobile OOI be a combatant OOI wearing a cloak over their clothes? Will they be clearly identifiable at all times or hiding in a tree?

Mobile OOI, judges, and non-combatants will be readily identifiable at all times based on the colour-coding of their clothes. They will not seek to hide their identity at any time, change from one category to another during the challenge, or hide in or under any infrastructure. They will not cross phase boundaries and will not 'appear' or 'disappear' for any reason.

8. Will the number of OOI be known beforehand?

Information on the number and nature of static and mobile OOI in Phase I will be made available to teams during their in-brief. Information on the number and nature of OOI during later phases will not be provided.

9. Do the mobile OOI have planned behaviour? Will their behaviour always be the same?

The movement of mobile OOI will be planned. Such movement may include stopping, turning, about face, reverse or continued manoeuvring. As a result their movements may appear 'random' or 'unpredictable' to teams.

10. Is the only difference between non combatants and combatants their shirt colour?

Mobile OOI and non-combatants may be discriminated on the basis of the colour/pattern of their clothing. Detailed information on the signatures of all OOI will be provided in December 2009 in the form of high resolution *.JPG images.

11. Are there any signature details or specifications available about the mobile and static OOI? What are their dimensions, material composition, shapes, or colour?

The down-selected teams will be provided with high resolution EO imagery from multiple perspectives, material composition, shapes, colour and dimensions of all OOI in December 2009. Detailed signatures the OOI will be provided to the down-selected teams as high resolution images in *.JPG format in December 2009.

12. The different OOIs will be indicated by painting in different colours. Do the UGVs need to identify the letters such as 'toxic waste', etc?

The images of mobile and static OOI shown in the MAGIC 2010 PowerPoint presented at the Participants' Conferences are only examples of the type of OOI that may be used. Mobile OOI may be distinguished from judges and non-combatants by the colour/pattern of their clothing. Static OOI will typically be suitcases, backpacks or high-contrast discs

or plates. Detailed signatures of the OOI will be provided to the down-selected teams as high resolution images in *.JPG format in December 2009.

6.0 Mapping, Exploration & Metadata

1. What key information about the environment and these OOI must be combined for transmission to the UGV operators and judges? The system must adequately survey the challenge area. Can you explain what you mean by ‘adequately’?

The UGV cooperative must fully and accurately explore and map all phase areas (and detect, locate, classify, and neutralise all mobile and static OOI). Teams will be given a list of static objects (e.g. roads, paths, buildings, doors, furniture, trees, grass, sandy ground, trenches, holes, manholes, safety barriers, fences, and obstacles) that they should accurately identify and locate and encode into their maps as metadata.

Teams should provide as complete a 2-D or 3-D map of the environment as possible. These maps will need to include the identity and location of key challenge infrastructure, a list of which will be provided to teams in June 2010. These objects will include positive obstacles (barriers, tress, walls, fences, vehicles, etc), negative obstacles (trenches, holes, etc), buildings (access points, key internal infrastructure, furniture, steps, doors, etc), the location and nature of different types of terrain (grass, sand, concrete, tarmac, etc), and the location and classification of all mobile and static OOI (at time of neutralisation). Teams will be told how to encode the metadata into their maps during the November 2009 site visits.

The final map will be required in WGS84 coordinates and should be provided as an integrated map of the area (inside and outside buildings) in the standard Geographic Tagged Image File Format (GeoTIFF).

2. What is the required mapping resolution?

Teams are required to provide integrated maps of the area (inside and outside buildings) to organisers in the standard Geographic Tagged Image File Format (GeoTIFF) map format at a resolution of 0.5m. UGV data should be logged at a rate of 1Hz.

3. It states that you can't use any classified or external data, but in terms of commercial data if you have access to a commercial company which has access to terrain data of the area, are you allowed to use it once we do know where it is?

No classified data or devices may be used in the preparation for or during the challenge. If the data is commercially or freely available to other potential participants, then teams may make use of it. Teams will not be provided with the precise location of the site until their pre-briefing session.

4. Do the UAV maps that are transmitted contain the information of the location of our UGVs? Can we see our own UGVs on those maps?

The UAV map will only provide the location of mobile OOI and non-combatants visible from an aerial perspective. It will not provide the location of the UGVs.

5. What is in the metadata provided from the UAV?

Teams will be provided with a high resolution overhead EO image in *.JPG format with the location of any visible mobile OOI and non-combatants superimposed onto this image. The OOI locations will be in WGS84 coordinates. Their positions will be accurate to within 0.5m.

6. What is the resolution of the UAV data that you will be providing?

The map will be provided as a *.JPG file with specified dpi resolution and taken from a known altitude (the resolution and altitude information will be provided in June 2010).

7. For the phase to be completed the area must be completely and accurately explored and mapped and the OOI must be accurately located and neutralised. Once both these tasks have been completed, should we continue to map the area?

Each phase area must be fully explored and mapped and all OOI located and neutralised to gain maximum points. Information regarding the number and nature of OOI in the second and third phases may be incomplete. Consequently, teams will not know that they have located all OOI until they have fully explored and mapped these phase areas. This process should account for the possibility that mobile OOI may have manoeuvred into previously explored areas.

8. What % of mapping is required indoor vs. outdoor?

A representative layout of the challenge area will be released in December 2009.

9. What size gap is considered unexplored? If the robot is not capable of entering the gap and hence cannot explore it, is there going to be a penalty?

Teams are expected to provide data with a spatial resolution of at least 50cm. Any gaps in the data greater than this will result in points being deducted. The UGVs will be able to access all areas of the challenge site that require mapping and will be physically prevented from accessing any areas that do not need to be mapped.

7.0 Platforms & Sensor-Disruptor Teams

1. Can we use vehicles not propelled by wheels?

Only independent, untethered ground vehicles are eligible to participate in the challenge. The ground vehicles must be propelled and steered principally by traction with the ground. The type of ground contact (e.g. tyres, tracks, legs, etc or hovercraft) is not restricted. If hovercraft are used the maximum hover height is less than or equal to 1 “effective” rotor disk off the ground or 0.5m, whichever is less.

2. Can we use the vehicles that jump, fly or bounce?

The vehicles must be propelled and steered principally by traction with the ground, which would not be the case for vehicles that jump, fly or bounce. A system comprising UGVs and one or more sub-systems that are not physically tethered to the UGVs is permitted provided the sub-systems are not propelled or manoeuvred independently of the UGVs, as would be the case for vehicles that jump, fly or bounce.

3. Are there any limitations to the type or variety of sensor platforms?

There are no limits imposed on the type or variety of sensor platforms so long as they are assessed as safe by the Technical Assessment Panel and comply with all MAGIC 2010 rules and guidelines. Vehicles must not damage the environment or infrastructure in the challenge area and vehicle operation must conform to any regulations or restrictions imposed by the applicable land-use authority. The vehicle must be able to travel on asphalt, concrete and paved surfaces without damaging these surfaces. Any aspect of vehicle activity or operation that has an unacceptable impact on the environment is prohibited. Such activities might include destructive vehicle behaviour, the use of abnormally hazardous materials, and/or generally reckless operation. All potentially hazardous equipment or activities must be identified to organisers for review during the site visits and the pre-mission-brief.

4. Can teams have a heterogeneous mix of sensor platforms?

Teams may use a heterogeneous mix of sensors, platforms, or both as long as they comply with all safety requirements and the MAGIC 2010 rules and guidelines

5. Clarification on the ratios: is it two sensor UGVs to one disruptor UGV?

The required minimum ratio of UGVs to avoid penalty is at least two sensor UGVs to one disruptor UGV.

6. Is it permissible to have five sensor UGVs and only one disruptor UGV?

Yes. Teams are confined to a maximum of three disruptor UGVs, but may have more than two sensor UGVs per disruptor. The ratio will be calculated on the basis of UGVs

that are ‘in play’ – that is, UGVs that have crossed the DSL and are participating in the challenge.

7. Is there an upper limit on how many robots we can have?

Teams may have a maximum of three disruptor UGVs, but as many sensor UGVs as they wish, as long as they maintain a ratio of at least two sensor UGVs to one disruptor UGV. Only UGVs that have crossed the DSL will be considered to be ‘in play’ and therefore contributing to this ratio.

8. Will teams be penalized if they exceed the 10km/hr speed limit?

Maximum speed limits are imposed for safety reasons. Minor and inadvertent excursions may be tolerated (i.e. < 10% for periods of 5sec or less and twice per phase), but major or repeated excursions (i.e. > 10%, periods longer than 5sec or more than twice per phase) will result in a UGV being “frozen” or disqualified. Judges will use ground truth data to determine this information. Judges will inform teams of any speeding violations. Teams are able to complete the challenge without exceeding the speed limit.

9. Does the 40kg maximum UGV weight include the weight of the antenna?

40kg is the weight of total maximum weight of the UGV, including any equipment, sensors, marsupial UGVs, hardware, etc that it may need to carry out its missions – and includes antennas. However, it does not include the RF tag provided to teams by the judges/organisers for ground truth. Marsupial and smaller UGVs may not ‘re-assemble’ into UGVs larger than 40kg.

10. Can disruptor UGVs be configured as sensor UGVs if needed or visa versa?

Sensor UGVs may not be configured or re-configured as disruptor UGVs (or vice versa) during or after a phase.

11. Can disruptor UGVs act as both sensor UGVs and disruptor UGVs?

The two roles are mutually incompatible. They must be of one or other configuration.

12. Can a transfer of function between sensor and disruptor UGVs occur in the DSZ? Can it occur between phases?

Sensor and disruptor functions may not be transferred between UGVs during or after completion of a phase.

13. Can we swap robots?

All UGVs must enter the challenge for the first time via the DSL. UGVs may then be ‘swapped’ at the DSL or in a DSZ. However, for a ‘new’ UGV to enter the challenge, an

'old' UGV of identical configuration must first have first exited the phase area at the same DSL/DSZ. All such activities must be conducted in consultation with and under the direct supervision of the judges, who must be notified in advance and agree to any procedures being carried out. Transferring data between UGVs entering and leaving the DSZ is also permitted, but both UGVs and their software systems must be configured to allow automatic pre-processing of any data without the need for human inspection of the data. The data may be copied to/from a flash drive onto the incoming UGV or via a communications protocol such as 802.11g or Bluetooth immediately prior to its entrance into the competition. No software may be transferred and no computer or other diagnostic hardware may be connected to either UGV until the challenge is declared complete.

14. What happens when the number of UGVs drops below the minimum number of 3 vehicles due to sniper or maintenance? Is the team disqualified?

The team is not disqualified. However, if a team has only one sensor UGV then it will be impossible to neutralise mobile OOI. Similarly, if a team has no disruptor UGV then it will impossible to neutralise static OOI. In both cases teams are likely to score less well than teams that are able to neutralise all OOI.

15. What happens when the ratio of 2 sensor UGVs to 1 disruptor UGV is changed by loss of a vehicle? Is the team disqualified?

Teams will not be disqualified if UGVs are lost through adversarial action during the challenge or through some technical fault, no matter what the ratios fall to. If vehicles are lost teams must continue to explore, map, locate and neutralise OOI, etc as best they can. However, they are likely to score less well than teams that have been able to maintain appropriate ratios and/or not lost vehicles.

16. If the disruptor UGV is lost due to sniper activity, how does a team demonstrate static OOI neutralisation?

If the team only has one disruptor UGV and that is lost to any sort of adversarial action then they can no longer demonstrate static OOI neutralisation. This should be considered in the make-up of a team's UGV cooperative as such teams are likely to score less well than teams that are able to neutralise all OOI.

17. Rule 10.6 appears to indicate that the disruptor robot must perform all of its own mapping to find a stationary OOI due to the fact that the sensor robots and disruptor robots cannot share any information? How does the sensor robot share the location of the stationary OOI without contributing to the situational awareness of the disruptor robot and visa versa?

Rule 10.5 states that sensor UGVs may share mapping and OOI location information with other UGVs, which includes disruptor UGVs. Disruptor UGVs may use to this information to navigate and locate static OOI. Rule 10.6 states that disruptor UGVs may

not share their mapping or other situational information with sensor UGVs or other disruptor UGVs.

18. What happens if you have a device that extends from the UGV and is able to look around corners or into buildings? Are the UGVs shielded by the walls and is the periscope protected?

The UGV and any fixed ‘extremities’ will be treated as a single entity located at the phase centre of the antenna of the RF tag supplied by the organisers for the purposes of determining ground truth. Any adjudication on the interaction between OOI and UGVs will be on the basis of the relative locations of the OOI and the RF tag (i.e. ground truth). A sensor probe can be used to look around corners without activating a static OOI or suffering lethal consequences. UGVs are shielded by walls in so far as they provide a line of sight protection from lethality and activation.

19. What is the maximum range that a UGV is allowed to view the mobile OOI?

There is no maximum range at which mobile OOI may be viewed

20. What happens if a team attempts to neutralize a stationary OOI from a range greater than 7 meters? Rule 10.18 Applies?

Static OOI may only be neutralised by a disruptor UGV approaching to within 2m of the OOI’s 5m diameter activation zone. Consequently, if the UGV is further than 4.5m from the OOI the action would constitute a false neutralisation attempt. False attempts to neutralise static OOI incur only the time penalty of the neutralisation process.

21. Will the sniper rule be performed randomly or at the judges’ discretion? How is the loss of UGVs normalised across teams with larger number of UGVs?

The sniper activity will be exercised in a manner commensurate with fairness and even-handedness across the teams relative to the aims of the challenge. The sniper activity will be spatially and temporally consistent across teams.

22. Rule 10.16 requires that disruptor UGVs navigate within a +/- 1m accuracy to successfully neutralize a Stationary OOI while avoiding being “frozen”. Can teams negotiate a greater range to neutralize the stationary OOI with some loss of points to reduce the chance of losing the UGV due to small GPS/IMU errors?

Teams cannot ‘negotiate’ an exchange of points for rules changes. The disruptor UGV must approach the static OOI to within 2m of its activation zone, which is 5m in diameter. However, disruptor UGVs may use any means to range themselves from the static OOI.

23. What happens when a mobile OOI enters the activation zone of a stationary OOI?

Mobile OOIs do not activate static OOI (Rule 10.17) so nothing happens when one enters its activation zone. However, if a static OOI is activated for any reason and the mobile OOI is within the lethality zone of the static OOI, the mobile OOI will be neutralised along with any other entities in the lethality zone.

24. What if we deliberately make contact with another UGV (e.g. to help it/push it/pull it/communicate with it)? Can we have this distinguished from an accidental collision?

If such a technique is likely to be required for some operational reason, the team leader should bring this to the attention of the TAP/organisers during the down selection process, together with the reasons as there may be safety implications. The TAP will then assess the proposal and devise specific safety rules. During the challenge, if a UGV is to intentionally make contact with another UGV for some operational reason, the lead operator must announce to the judges prior to the activity taking place that this is intended (and why). Assuming that the 'nudge' is controlled no points will be deducted – except those that may be deducted for other reasons (e.g. tele-operation, breakdown, etc).

25. Can a disruptor UGV participate as a (second) UGV that views a mobile OOI to neutralize it?

Mobile OOI may only be neutralised through the use of two sensor UGVs. Disruptor UGVs may only be used to neutralise static OOI.

26. Can a disruptor UGV participate (re 12.17) as the UGV that locates and identifies OOI/Humans inside buildings?

Information from a disruptor UGV's sensors may be communicated to the operators and used for its own navigation purposes, but may not be communicated between the network of sensor UGVs. If, on the basis of information communicated to the operators by the disruptor UGV via the GCS, they wish to re-task their sensor UGVs to locate the 'mobile' OOI inside the building this is permissible. However, the human-interaction will result in a deduction of points. Disruptor UGVs are intended for the neutralisation of static OOI, which do not include 'mobile' OOI that are not moving.

27. Is a disruptor UGV allowed to communicate its sensor information to the rest of the team?

A disruptor UGV may carry sensors and payloads, which may contribute to its own navigation and situational awareness. This information may also be transmitted to the GCS and the operators. However, this sensor information may not be transmitted to or shared with other sensor or disruptor UGVs in the network. Furthermore, the information may not contribute to the overall exploration and mapping process. A disruptor UGV should be used solely for neutralising static OOI.

28. Would the disruptor UGV be able to transmit its coordinates to the other UGVs?

A disruptor UGV may share its location with operators and the ground station. If, on the basis of the information communicated to the operators by the disruptor UGV via the GCS, they wish to re-task their sensor UGVs this is permissible. However, the human-interaction will result in a deduction of points. Disruptor UGVs may only neutralise static OOI, which do not include 'mobile' OOI that are not moving.

29. How will the organisers ensure that data is not being transferred between the sensor and disruptor robots?

Judges and organisers will be closely monitoring certain team and UGV activities. Any team found to have breached this rule will be disqualified.

30. Is it OK to place recharging devices onboard the UGVs (i.e. a generator, solar panel, or regenerative braking)?

Teams may use technologies that recharge or augment batteries so long as the technology is considered safe by the Technical Assessment Panel.

31. Can a disruptor UGV benefit from sensor UGV re-transmission?

Disruptor UGVs may receive transmissions from sensor UGVs and the GCS. These transmissions may come directly or via radio relays carried by dedicated UGVs, sensor UGVs, or static modules. Disruptor UGVs may not carry radio relays. If disruptor UGVs need to transmit or receive legitimate disruptor data to/from the GCS via radio relay this must be carried out on a separate channel/frequency to the sensor network. This channel/frequency separation must be adequately demonstrated to organisers during the site visit and the in-brief. Alternatively, the disruptor UGVs must operate autonomously and 'out of contact' with the GCS until such time as they are able to re-establish contact with it.

8.0 Sensor Deployment, Marsupial UGVs & UAVs

1. Can a UGV release or throw sensors or robots?

A UGV may safely release mobile and static sensors or other modules (e.g. radio relays) throughout the challenge area if these vehicles maintain contact with and are principally propelled through traction with the ground. A system comprising UGVs and one or more sub-systems that are not physically tethered to the UGVs is not permitted if the sub-systems are propelled or manoeuvred independently of the UGVs, as would be the case with UAVs or systems that are ‘thrown’ or propelled with force from a host vehicle.

If the deployed sub-systems are propelled and steered principally by traction with the ground they are permitted and will be considered ‘marsupial’ UGVs. However, the marsupials must be configured in either sensor or disruptor configuration and a host of one configuration may only carry marsupials of its own configuration. Marsupial UGVs will be included in the disruptor and sensor UGV totals and ratios. All marsupial UGVs must carry E-Stops and freeze mechanisms.

If the deployed sub-systems do not have propulsion they will be considered ‘sensors’, which may only assist or augment the UGVs in functions such as detecting, tracking or recognising OOI (or enhancing UGV network connectivity). That is, sensors may not replace the functionality of a UGV in relation to tasks specified in the rules such as neutralisation (i.e. only two UGVs may track a mobile OOI for 15 seconds in order to neutralise it). The sensors may be cleared by the UGVs during each phase or left in situ until the end of the challenge. The combined weight of any sensors carried by the UGV and the UGV itself must weigh less than 40kg at all times. All sensors must carry freeze mechanisms and RF tags.

2. Is there any penalty if a mobile OOIs stumbles across one of these sensors, motes or marsupial UGVs, or if such systems stumble across an OOI?

Marsupial UGVs, sensors and any other systems and subsystems deployed from a host UGV will be affected by the lethality and activation zones of OOI as if they were UGVs. That is, if they enter the 5m diameter activation zone of a static OOI they will cause it to detonate and will be destroyed; if they are within the 20m diameter lethality zone of a static OOI when it detonates they will be destroyed; if a mobile OOI manoeuvres such that sensor or marsupial UGV falls within its 10m diameter activation/lethality zone it will be destroyed. As a result, all such sensor/UGV systems must therefore carry ‘freeze’ mechanisms and RF tags to allow them to interact with OOI.

3. Would such destruction also necessarily disable the deploying or controlling UGV?

The interaction between OOI and UGVs, sensors, marsupial UGVs, etc will be on the basis of their own independent location. Consequently, destruction of a remotely deployed sensor or marsupial UGV would not affect the ‘host’ or controller UGV, unless it too was within the relevant lethality zone of the OOI.

4. What happens to any sensors or marsupial UGVs still onboard the host UGV if the host UGV is destroyed through interaction with an OOI?

As the all UGVs, sensors and marsupial UGVs are within the lethality zone of the OOI, the destruction of the 'host' UGV will result in the loss of all sub-systems on board.

5. Are sensor sub-systems only deployable by sensor UGVs and static disruptor sub-systems by disruptor UGVs?

Sensor UGVs may deploy/retrieve remote sensors. Disruptor UGVs may not deploy static sub-systems that replace the functionality of the disruptor UGVs in relation to the static OOI neutralisation tasks specified in the MAGIC 2010 rules.

6. Can disruptor UGVs be deployed by sensor UGVs? Can disruptor UGVs be deployed by other disruptor UGVs?

Marsupial UGVs may only be carried by and operate in the configuration of their host UGV. A disruptor UGV may therefore safely release other disruptor UGVs so long as the marsupial is propelled and steered principally by traction with the ground. A maximum of three disruptor UGVs is permitted; marsupials are included in this total. If the host UGV is destroyed, any marsupials on board at the time would also be lost.

7. Would disruptor sub-systems that remained stationary and designated a static OOI for 30 seconds satisfy the neutralization requirement of Rule 10.6?

Sensors and modules may assist or augment the UGVs in any function (e.g. detecting, tracking and recognising OOI or enhancing UGV network connectivity), but they may not replace the functionality of the UGVs in relation to tasks specified in the rules (i.e. only the UGVs must track and designate any OOI in order to neutralise them). A static disruptor sub-system would not meet the neutralisation requirements of Rule 10.6.

8. Would a sensor subsystem that viewed a static OOI from 35 metres away be safe?

Any static sensor that remains outside the 20m diameter lethality zone of a static OOI and outside the 10 m diameter activation/lethality zone of a mobile OOI would be safe.

9. Would a sensor sub-system viewing a mobile OOI for a sensor UGV satisfy as one of the views of 10.11 required for neutralization?

Sensors and modules may assist or augment the UGVs in any function (e.g. detecting, tracking and recognising OOI or enhancing UGV network connectivity), but they may not replace the functionality of the UGVs in relation to tasks specified in the rules (i.e. the UGVs must track and designate any OOI in order to neutralise them). To neutralise a mobile OOI it must be simultaneously viewed by two UGVs. A static sensor sub-system would not meet the neutralisation requirements of Rule 10.11.

10. What about collection and re-deployment by a different UGV of the same class?

Any disruptor UGV may safely release and retrieve marsupial disruptor UGVs. Similarly, any sensor UGV may safely release and retrieve other marsupial sensor UGVs.

11. Can UGVs be controlled by and information relayed to/from a different UGV from the one that deployed it (but the same class)?

UGVs may be controlled via other UGVs. However, disruptor UGVs may only use their sensor data for their own navigation purposes and/or communicate it to the operators at the GCS. This information may not be shared with other UGVs within the network.

12. Can disruptor UGVs relay information from other UGVs direct to the operators, or broadcast (actually we plan to use multicast) to all UGVs and operators?

Disruptor UGVs may not share information with other UGVs within the network and so may not act as radio relay stations.

13. Are robots allowed to deploy periscopes or use feelers?

Periscopes and other extender arms are permitted, provided they remain below the 2m safety limit. The combined weight of any sub-systems carried by the UGV and the UGV itself must weigh less than 40kg at all times. As long as these 'probes' remain attached to the UGVs these extended sensor systems will be considered part of the UGV. The interaction between the OOI and UGVs will be adjudicated on the basis of the location of the OOI relative to the RF ID tag placed on the UGV by challenge organisers. Teams can anticipate that this tag will be placed near the centre of the host UGVs. If the extended sensor needs to be controlled through human interaction the team will lose points. Any sub-system that may be detached from the host UGV must also be fitted with 'freeze' mechanisms (and E-Stops if they contain propulsion mechanisms) to allow them to interact with mobile OOI. These detachable systems will also be expected to carry RF tags to determine their ground truth.

14. If Phase I involves the deployment of remote static sensors from multiple UGVs are the sensors allowed to be left in situ for later phases?

Each phase area will involve the use of different terrain and OOI from one area will not cross into or 'contaminate' another. Sensors or UGVs in previous phase areas remaining in situ are unlikely to assist planning, exploration, mapping or OOI location in later phases. However, they may be left in situ or teams may request that they be collected by judges and returned to teams in the DSZ or DSL. In accordance with 'minor servicing' regulations (section 12.2 MAGIC 2010 Guidelines), teams may then re-load marsupial UGVs and sensors onto their host UGVs at the DSL or within the DSZ.

15. What happens if we deploy some sub-system or device and it enters the 20m diameter lethality zone of a static OOI?

Marsupial robots, sensors, and other deployed sub-systems will be affected by static and mobile OOI as if they were UGVs. That is, if they enter the 5m diameter activation zone of a static OOI they will cause it to detonate; if they are within the 20m lethality zone of a static OOI when it detonates they will be destroyed; if a mobile OOI manoeuvres such that the sensor or marsupial UGV enters its 10m diameter activation/lethality zone the sensor/robot will be destroyed. As a result, all such sensor/robot systems must therefore carry 'freeze' mechanisms and RF-ID tags (i.e. ground truth) to ensure that their contribution to the situational awareness picture can be suitably monitored and restricted on a judge's command.

16. Are we allowed to use UAV's?

No. A simulated UAV feed will be provided. Other UAVs are not allowed. All vehicles must be propelled and steered principally by traction with the ground. Systems comprising UGVs and one or more sub-systems that are not physically tethered to the UGVs is permitted provided the sub-systems are not propelled or manoeuvred independently of the UGVs, as would be the case with a UAV.

17. Are MAV allowed?

No. Micro Air Vehicles (MAVs) are not allowed. All vehicles must be propelled and steered principally by traction with the ground.

9.0 Challenge Operations

1. Are we allowed to watch the other teams?

No. Unfortunately, this would provide the teams participating later with an advantage and will therefore not be permitted. It is hoped that a video will be produced after the event.

2. Can teams set up localization signals outside the perimeter of the challenge area?

No. Teams may set up their own localisation and/or any other infrastructure within the challenge area during the set up and rehearsal periods, but this must be dismantled and removed prior to the commencement of the challenge. Any or all use of such equipment must comply with spectrum usage regulations and organisers must be informed of the Team's proposed spectrum usage and intentions. No infrastructure may be set up outside the challenge area at any time. During challenge operations, localisation, computing and other communications infrastructure may be carried and/or deployed by the UGVs themselves as part of the challenge solution. The combined weight of such modules and the UGVs must remain less than 40kg.

3. Does time stop between phases?

Time does not stop between phases. It will run continuously until the end of the challenge unless there is a weather event, a failure of organiser-provided infrastructure (such as a failure of the simulated UAV feed) or some other event deemed sufficient by judges for such action to be sanctioned.

4. Must the UGVs actually traverse the sandy/grassy areas to complete the challenge?

The UGVs must explore and map all of the challenge area. This will include some grassy and sandy areas. If a team is able explore and map the area without traversing it they do not need to. However, if static OOI are located within these areas, the disruptor UGVs may need to approach them to within 2m of their activation zone in order to neutralise them. A team that cannot do this for some reason will be scored lower than one that can. Traversing the grassy or sandy areas is not a requirement traversing the course.

5. What percentage of the challenge area is the grassy/sandy terrain?

A representative layout of the challenge area will be released in December 2009. Most of the roughly 500m by 500m challenge area is solid ground (i.e. either tarmac or concrete), although there are around five areas of sand or grass that have dimensions of up to 50m by 30m.

6. What is the height of the grass?

The grass will be mown and no higher than a couple of centimetres. Special mobility characteristics will not be required to negotiate the grassy areas.

7. What do the ‘additional obstacles’ placed by the organizers that should be negotiated as appropriate look like?

The obstacles will be large and obvious and may include barriers, barrels, vehicles, and fencing all impassable to UGVs with mobility characteristics required for this challenge.

8. Do UGVs have to traverse the second storey?

Operations inside buildings will be conducted on the ground floor alone. The UGVs do not need to negotiate steps, stairs, lifts/elevators, etc.

9. Will the number of OOI per phase be known to the team a priori?

Teams will know the number and nature of OOI in Phase I. Information on later phases will be incomplete.

10. Will the organizers be measuring the mass of each UGV on the day of the event?

Yes. Furthermore, if the weight of one or more UGVs is considered ‘marginal’, they may be re-weighed at their discretion.

11. Please describe what constitutes ‘diverting from a logical path’ in terms of robotic movement within the competition area?

The phrase ‘diverting from a logical path’ means the UGV has started to act erratically, in a manner consistent with a loss of higher-level and/or moment-to-moment control, or in a manner inconsistent with safe practices relative to challenge infrastructure, participants, organisers, spectators, etc.

12. How many receptacles for 240V 50Hz power will be available at the GCS and each of the DSZ?

Organisers will provide teams with as many outlets as they require, but should let organisers know (in writing) roughly how many they require by June 2010. The sockets provided will be of standard Australian “Oblique Flat Blade, Inverted-V” variety. For more information on the Australian plug configuration teams should visit a website such as <http://www.kropla.com/electric2.htm>. Teams may bring their own distribution boards, but these need to be presented to the qualified electricians on site for testing so that they can be declared safe prior to use in the challenge.

13. What is the maximum height of allowable antennas at the GCS?

For safety reasons, teams may not install their own antenna infrastructure if this exceeds a height of 2m. Organisers will provide a ‘cherry picker’ that can be raised to a height of 10m and has the capacity to carry up to 200kg. It is anticipated that only small or light

weight equipment (light-weight antennas and amplifiers) will be placed on this elevated platform. If teams are expecting to deploy heavy equipment or physically large antennas they must declare this to the TAP during the site visits.

14. What is the maximum distance that an antenna may be positioned from the GCS?

Fixed communications equipment may only be set up at the GCS, within the operations area. Any communications relay stations must be carried by UGVs and are subject to the rules pertaining to vehicles. The operations area will be about 30m by 30m.

15. Can retransmission antennas be positioned at the DSZ to allow for troubleshooting with the GCS?

During the challenge communications equipment may only be set up within the operations area. During the setup and rehearsal phases, teams may set up antennas for the purposes of troubleshooting. However, these must be removed from these locations by the commencement of the final reset period.

16. What happens if all or a portion of the interior lighting fails during exploration of the interior of a building? Is the challenge time stopped while the problem is resolved?

Most buildings have multiple light sources and failure of some of them should not present a problem. If for some reason the lighting conditions inside buildings fall below what judges consider reasonable for the routine operation of COTS EO sensors, teams will be given the option of having the challenge time stopped until a suitable repair is affected.

17. Are operators allowed to move forward to support servicing of the UGV at the DSZ? Rule 10.21 allows operators to service UGV Rule 10.23 restricts operators to the GCS.

Operators are not permitted to leave the operator's zone. If desired, the UGVs can be driven (or transported by judges) to the operator's zone from the DSZ and serviced there.

18. How will the team leader communicate coordinates, neutralization requests, etc. to the judges? Although verbally would seem to be the assumption, communication via the computer display would be more accurate and efficient.

Judges will be in the immediate proximity of the operations team and will have access to the team's second situational awareness displays (and other displays containing ground truth). Direct verbal communications in English should be used. A lexicon of appropriate phrases will be provided in June 2010. Radio communications equipment will be provided by the organisers and the judges and teams will have access to the same operator and situational awareness displays.

19. Are communications between the Operations Team and the Support Team allowed (for example to provide status information from the DSZ/DSL between phases). Rule 10.23 doesn't clearly prohibit them

Communications between these teams are permitted and radios will be provided. The support team will not have visibility of or access to the challenge area. Communication between these team elements should be restricted to the status of UGVs.

20. Is there any advantage/bonus (other than time) in UGVs continuing to the next phase without service (11.9)?

There are no bonus points for operating in this way: time is the primary advantage.

21. Are team members allowed to be in the designated zones? How many DSZ will there be? And can we change the personnel from one zone to another?

There will be one Operator's Zone, one Designated Starting Line (DSL), and Designated Servicing Zones (DSZ) at the end of each phase. Operators and support staff may not leave their designated zones during the challenge without permission from the judges. Operators and support staff may not exchange roles during the challenge.

The operations team comprises up to 2 individuals identified to the challenge organisers on the team roster. Only these individuals are allowed to enter the designated operator's zone and/or operate/supervise the multi-UUV cooperative during the challenge. They may not leave the operator's zone, but are permitted to power up, re-charge or replace energy sources on the UGVs that are in the operator's zone. Operations team members may also affect minor repairs after permission has been granted by the judges as per normal repair judging procedures.

The support team comprises up to 3 individuals identified to the challenge organisers on the team roster. Only these individuals are allowed to enter the designated servicing zones during the challenge. They may not leave the designated servicing zones during the challenge. Support teams must designate a single individual in each DSZ/DSL to serve as the support team leader to communicate with judges.

22. Is there a minimum level of autonomous command and control that has to be present on board each UGV or are there any limitations on the amount of command and control which can be applied from the ground station for example? More specifically it's about the ground station UGV interaction, not with the human in the loop. Is there a minimum level of autonomy that these UGVs have to display or contain, and are there any limitations on what the ground station interaction?

Tele-operation will be heavily penalised. Teams proposing solutions that include tele-operation as a component of their mission profile are unlikely to be down-selected. The less the human interaction, particularly in regard to the moment-to-moment control of the UGVs, the stronger the likely entry. In regard to the distribution of autonomy (i.e. whether the processing is carried out on the UGV, on one ('mothership') UGV, across several UGVs, or at the GCS) organisers are agnostic. This is a judgement that must be made by participants.

23. Can the task of labelling OOI can be done by a human operator without penalty?

The detailed scoring processes will be released in due course. The more interaction an operator has with their ground station (and hence with the UGVs) the more points they will lose.

24. Is there a restriction on the computing power?

The amount, nature and distribution of computer processing are at a team's discretion. Any number of computers and communications sites may be set up at the ground control station (GCS) or carried by UGVs participating in the challenge.

25. Given the situational awareness scenario, how do you measure the tasking workload?
Isn't it difficult for someone to measure the cognitive workload?

Details of the assessment and evaluation criteria will be released in December 2009.

26. We are penalized if we run into something; what happens if something runs into us?

Each team will attempt the challenge on a different day. Other than a team's cooperative of UGV's the only mobile elements within the challenge area will be mobile OOI, non-combatants and judges. It can be assumed that none of these will deliberately interfere with any of the UGVs taking part in the challenge.

10.0 Environment & Challenge Area

1. Are all the ramps marked, or are we expected to discover some/all ramps?

Access to certain buildings may be via ramps and it will be necessary for the UGVs to find/discover and negotiate these access points. Ramps will be placed in locations where UGVs may need to negotiate discontinuous obstacles in excess of 10cm. A list (and images) of infrastructure objects that need to be identified and located throughout the challenge area will be provided in June 2010.

2. Is there a maximum steepness on any of the ramps?

Mobility and traction is not a component of this challenge. Teams can anticipate slopes to be a maximum of 15 deg.

3. Where will the tower or platform be made available for mounting antennas?

A 10m high 'cherry picker' will be provided for the placement of antennas and other GCS equipment. This platform will be located near the GCS in the operator's zone. This will be within the 500m x 500m challenge site.

4. Will the challenge be called off if the environmental conditions (e.g. rain or light) fall outside the defined parameters? What if this occurs part-way through a mission?

The challenge will be conducted in daylight and illuminated indoor conditions and precipitation of as much as 1mm/hour. Should the weather fall outside these conditions, the challenge will be interrupted (challenge time will stop) until conditions are once again within these limits. Teams will not be penalised for such outages if this occurs mid-mission.

5. Will the area have a closed boundary?

The challenge area has a closed physical boundary separating it from the rest of the world

6. Can we use the 'cherry picker' to mount other items?

After consultation with organisers other equipment may be attached to the 'cherry picker'

7. Is the map area 500m x 500m for every phase?

The entire challenge site will be about 500m x 500m. The individual phase areas will be smaller than this. There will be three phase areas.

8. Is Ground control station stationary? Or does it move with the phases

The GCS, DSL, and DSZ are all fixed and will not move between phases.

11.0 Breakdown, E-Stop & Freeze

1. What is the difference between e-stop and freeze? What are the implications of each?

Freezing a UGV means bringing the vehicle to a prompt stop, with brakes applied to hold the vehicle still, and disabling any contribution that it makes to its own, other UGVs', or the operators' overall situational awareness picture. The vehicle may continue to draw and generate power and is permitted to resume forward motion when judges allow. Teams will be commanded to freeze a UGV if judges consider that it has been damaged by OOI or snipers.

Each UGV must be fitted with an 'E-Stop' that can be triggered remotely on a judge's command. E-Stops will be used when a UGV starts to act erratically, in a manner consistent with the loss of higher-level or moment-to-moment control, or in a manner inconsistent with safe practices relative to challenge infrastructure, participants, organisers, spectators, etc. Activation of the E-Stop must disable all electrical and propulsion systems, while applying and maintaining the brakes.

Points will be deducted for UGVs that are frozen or that breakdown in accordance with the scoring criteria that will be released in December 2009.

2. Can the UGVs then be re-used in another phase?

If a vehicle has been frozen it may be recovered for use in another phase. If a vehicle has been E-Stopped it may only be used in another phase if the circumstances are such that the judges consider it is safe for the vehicle to continue participating in the challenge.

3. A frozen unit can continue to generate and draw power. Does that indicate that it is still an active UGV that can be used as a base station from which other UGVs draw power from? Is the UGV considered to be sitting on the battlefield with its power source active or obliterated?

UGVs that have been frozen should be considered 'inoperable' for the duration of the phase and other UGVs should interact with them as if they were obstacles. Other UGVs should not communicate or draw power from the frozen UGVs. For practical reasons the organisers are permitting teams to re-use the frozen UGVs once the phase is completed. The frozen UGVs are permitted to continue generating and drawing power to avoid 'brown-outs' in key electrical equipment.

4. If a UGV is completely powered down and we cannot re-start it automatically, is it a matter for the judges/operators to attend to?

Teams are permitted to carry out minor repairs such as re-attaching a cable, electronic re-booting, or replacing a faulty payload module are permitted within the DSZ, but only after consultation with and under the direct supervision of the judges. Items must be of an identical configuration to those being replaced. Major repairs or modifications may not

be carried out at any stage during the 3.5 hour challenge. Once the phase has ended, the team leader might also request that organizers collect some of the UGVs that have unexpectedly stopped working so that they may be serviced in the DSZ. Organisers will lift and transport the UGVs out of the challenge area using four-wheel push carts. All attempts will be made to ensure that the UGVs are not damaged in any way, but ultimate responsibility for the design of a UGV that is robust to this process rests with teams. Judges will not physically interact with UGVs except in this way. Teams should brief judges on safe recovery procedures for each UGV type during the in-brief

5. What happens if the UGV stops or runs out of batteries in the middle of a mission?

Penalties will be applied for UGVs that break down. However, teams are expected to be able to adapt to the loss of their asset. Once the phase has ended, the team leader can request that organizers collect of the UGVs that have unexpectedly stopped working so that they may be serviced in the DSZ. Minor repairs are then permitted within the DSZ, but only after consultation with and under the direct supervision of the judges. Major repairs or modifications may not be carried out at any stage during the 3.5 hour challenge.

6. If one UGV out of three operating stops because of batteries, does that mean the ratio of sensor to disruptor UGVs is reduced and that the team will be penalized?

If the sensor-to-disruptor ratio is violated teams may expect to lose points. Penalties will also be applied for UGVs that break down.

7. Are there penalties for abandoning a robot?

If a UGV is deemed to have 'broken down' (e.g. run out of power) penalties will be applied. If teams decide to abandon a fully functional robot, the judges will expect the lead operator to explain the reasons why the decision to abandon it was made prior to determining if application of a penalty is appropriate. Details of the judging criteria will be released in December 2009.

8. Does E-stop have to remove all power, and hence preclude re-starting?

Activation of the E-Stop must disable all electrical and propulsion systems, while applying and maintaining the brakes. If a vehicle has been E-Stopped it may only be used in another phase if the circumstances are such that the judges consider it is safe for the vehicle to continue participating in the challenge.

9. Can a vehicle subjected to an e-stop be recovered and used in a subsequent phase?

E-Stops will be used when a UGV starts to act erratically, in a manner consistent with the loss of higher-level or moment-to-moment control, or in a manner inconsistent with safe practices relative to challenge infrastructure, participants, organisers, spectators, etc. If a vehicle has been E-Stopped it may only be used in another phase if the circumstances are

such that the judges consider it is safe for the vehicle to continue participating in the challenge.

10. When would e-stop be used?

E-Stops will be used when a UGV starts to act erratically, in a manner consistent with the loss of higher-level or moment-to-moment control, or in a manner inconsistent with safe practices relative to challenge infrastructure, participants, organisers, spectators, etc.

11. When would freeze be used?

Freezing will be used to simulate damage from snipers, damage by static and mobile OOI or for rules violations such as speeding. All UGVs may be unfrozen at the end of a phase.

12. Can a lead operator to discuss with judges whether a robot has a likelihood of extricating itself before issuing an e-stop or freeze command?

All decisions and matters pertaining to the execution of a team's challenge operations are a consideration for the team and its leader. Participants should not seek and judges will not offer opinion or enter into conversation with teams during the challenge. If, at the end of a phase, a team has a robot whose status is unknown they can request or execute an E-stop of the robot and movement to the DSZ.

The chairman of the judges is the final authority on all rules and mission execution of MAGIC 2010. The chairman of the judges has the authority to change aspects of the mission execution and provide interpretation of the rules at any time and in any manner that is required. The chairman will ensure that all interpretations are made available to all teams to maximum extent possible under the team-proprietary guidelines.

12.0 Communications & Spectrum

1. Can we use mobile phones for communications and/or navigation purposes? Can we send text messages between UGVs?

Communications may be by radio, infra-red, acoustic or other means so long as they are considered safe by the Technical Assessment Panel (TAP) and comply with local spectrum regulations. These regulations are available from www.acma.gov.au. All use of the radio spectrum is the responsibility of the teams.

2. Will there be any mobile coverage on the site, or is it a remote area? Do I get extra marks if I use satellite phones?

Information on the location of the site will be released in due course. Details of the judging and evaluation criteria for mission level, systems, and technical achievement will also be released in due course. No extra points will be awarded solely for the use of satellite phone spectrum.

3. Will there be an attempt to deliberately jam wireless communications?

No attempt will be made to deliberately disrupt, jam or spoof communications or GPS. Spectrum monitoring equipment will be on hand to assist teams and organisers identify any erroneous sources of interference.

4. Is there a limit on the communications technology?

No umbilical links are permitted. Communications between the operations team and their UVS may be by radio, infra-red, acoustic or other means so long as they are considered safe by the Technical Assessment Panel (TAP). All techniques and devices must comply with all Australian Communications & Media Authority (ACMA) regulations.

5. What mechanisms are acceptable for communications between team leader and judges during the competition?

Judges will be in the immediate proximity of the operations team and will have access to the team's second situational awareness displays (and other displays containing ground truth). Direct verbal communications in English should be used. A lexicon of appropriate phrases will be provided in December 2009. Radio communications equipment will be provided by the organisers.

6. There is a danger with so much innovation, integration, and integration that (say) the GPS's might interfere with each other?

Electromagnetic compatibility and interference are systems integration issues that teams must deal with through their individual approaches to design.

13.0 Media & Photography

1. Will the challenge be open to public?

The challenge will not be open to the public. Entry will be by invitation only.

2. Are there any security restrictions?

No classified data or equipment may be used in preparation for or during the challenge. Appropriate security will be in place at all times.

3. When the challenge takes place, will there be media coverage? Can we inform our sponsors of the coverage provided for the event? Or will it be more like the DARPA Grand Challenge?

There may be limited media coverage, but teams should not lead their sponsors to believe that the media coverage will be extensive. Teams may expect the coverage to be 'like the DARPA Grand Challenges' to avoid teams competing later from deriving an advantage.

4. Will we be allowed to film ourselves to share the information of our sponsors?

Cameras carried by members of the audience will be permitted onto the site. However, due to the size of the area and urban nature of the setting the audience will probably be unable to view the majority of challenge area or operations except via the displays provided by organisers. Organisers will make every attempt to record this imagery and may provide teams with a copy of their entry after the event. However, at no stage will team personnel or members from the audience be permitted to enter the challenge site during operations. Organisers will also be recording the operations and support team on multiple video streams for the purposes of adjudication. This information may also be made available to teams after the event.

During the set-up and rehearsal periods and after the completion of the challenge, teams may take videos and photographs for 'personal' reasons if they feel that they have time to do so. However, this imagery may not be used for any the purposes associated with participation in the challenge. Personnel participating as members of the operations and support team are also permitted to take video and photographic imagery during the challenge if they believe they have time to do so and this imagery is not used for any purpose associated with participation in the challenge. However, like the audience – and because of the nature of the challenge – they will probably be unable to view the majority of challenge area or operations. Teams may also record the data from the sensors onboard their UGVs.

5. Will we be able to make our own videos at the event?

Teams may not record video of their own performances outside what is described above

14.0 Reimbursement & Costs

15.0 Future Challenges

1. Will the competition run over several years if teams do not achieve the desired results in November 2010?

Neither RDECOM nor DSTO can give formal guarantees to any future challenges or funding commitments.

2. Does the DSTO or the Australian Department of Defence have a pre- or post-competition funding commitment to successful Australian entrants?

There are no US, Australian or any other national 'quotas' for entrants. All entrants will be funded on merit alone, regardless of the team's nationality. Entrants that demonstrate success in the finals may apply for and qualify for follow-on R&D funding. Funding vehicles could include the Australian DoD (Capability Technology Demonstrator) CTD program or various US DoD programs including a BAA contract, Foreign Comparative Testing, direct R&D contract and the US Joint Capability Technology Demonstrator (JCTD) program.

16.0 General Clarifications

1. Will the questions be collected and responded to formally on the website?

All questions/answers are posted at www.dsto.defence.gov.au/MAGIC2010/

2. What is the right address to send questions about the technical requirements?

All queries should be sent to MAGIC2010@dsto.defence.gov.au

3. Will the MAGIC 2010 Participants' Conference PowerPoint presentation slides from the Participants' Conference be posted to the MAGIC2010 website?

This is now posted on www.dsto.defence.gov.au/MAGIC2010/

4. In the original release it was mentioned that the top three teams may be sponsored by the DoD. Is this the top three Australian teams or the top three teams overall?

The top three teams may qualify for further sponsorship from the US Department of Defence through their CTD programs. If an Australian team qualifies in the top three, it may also be considered for funding through the Australian Department of Defence CTD program. Neither the JCTD nor the CTD funding is formally guaranteed.

5. It's a short time span to work from the ground up, even with the available COTS, is there any anticipation for future competitions?

Organisers are aware of the aggressive and compressed time-scales. Unfortunately, neither RDECOM nor DSTO can give formal guarantees to any such commitment.

6. Who is responsible for providing answers to the technical questions?

The Technical Assessment Panel (TAP) for MAGIC 2010, which comprises a group of internationally respected experts, will provide answers to all technical questions. All questions should be addressed to MAGIC2010@dsto.defence.gov.au.