DRAFT PROPOSAL:

Simulation Strategy for Anaesthesia

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NHS Education for Scotland

INTRODUCTION

Purpose of this document

This document gives an initial proposal for simulation training that should be fully integrated into the training programmes of anaesthetic trainees in Scotland. It is a summary of the training that can/should/could be delivered locally, regionally and nationally, and which simulation activity requires funding.

Decisions are based on reviewing curriculum along with current simulation activity across Scotland, and focus group discussions with trainees, training program directors, simulation faculty, lay representatives, ODPs, and Royal College of Anaesthetist representatives. In addition simulation curriculum in other regions of the UK and Canada (an example of a highly integrated and successful simulation programme) have been reviewed and discussed. Further stakeholder involvement is required and planned in the development and evolution of this strategy.

It is also based on using a constructively aligned simulation programme, where the most effective and efficient method of simulation is used for different learners and different learning (see table below).

It does not include all simulation activity that could be available. There will be anaesthetists with sub-specialist interests who may wish to use their study budgets to take courses that are relevant to their career development. Instead, these activities represent the core training that we think is required for all trainees to progress through the curriculum, and delivered in an equitable and sustainable manner.

This document is not the finished product!! It is meant as a starting point to adjust and develop over time, and we welcome contributions from all stakeholders in how we can take things forwards, and improve the effectiveness and efficiency of training in Scotland.

If I have got things inaccurate or missed out activity that I am not aware of, then I apologise. Please get in touch to let me know and I will incorporate it!

Principles and scope

In alignment with the simulation strategy and curriculum from the Royal College, we believe simulation has an important role in improving the efficiency and quality of training and in maintaining patient safety. We have defined simulation as any activity that seeks to represent or partially recreate clinical practice. To maximize efficiency of this often resource-heavy method of training, we would suggest that we try and match the learners' needs with the most efficient methods. To do this, we would recommend the Knowledge/Skills/Drills/Performance framework in order to categorise different learning needs and simulation activity (see next page).

We must also remember that some of this learning will not require any simulation. If there is enough exposure and it is practical and safe to teach things effectively using real clinical encounters, then we should strive to do this well, and focus our attention and resources on the areas that do require simulation.

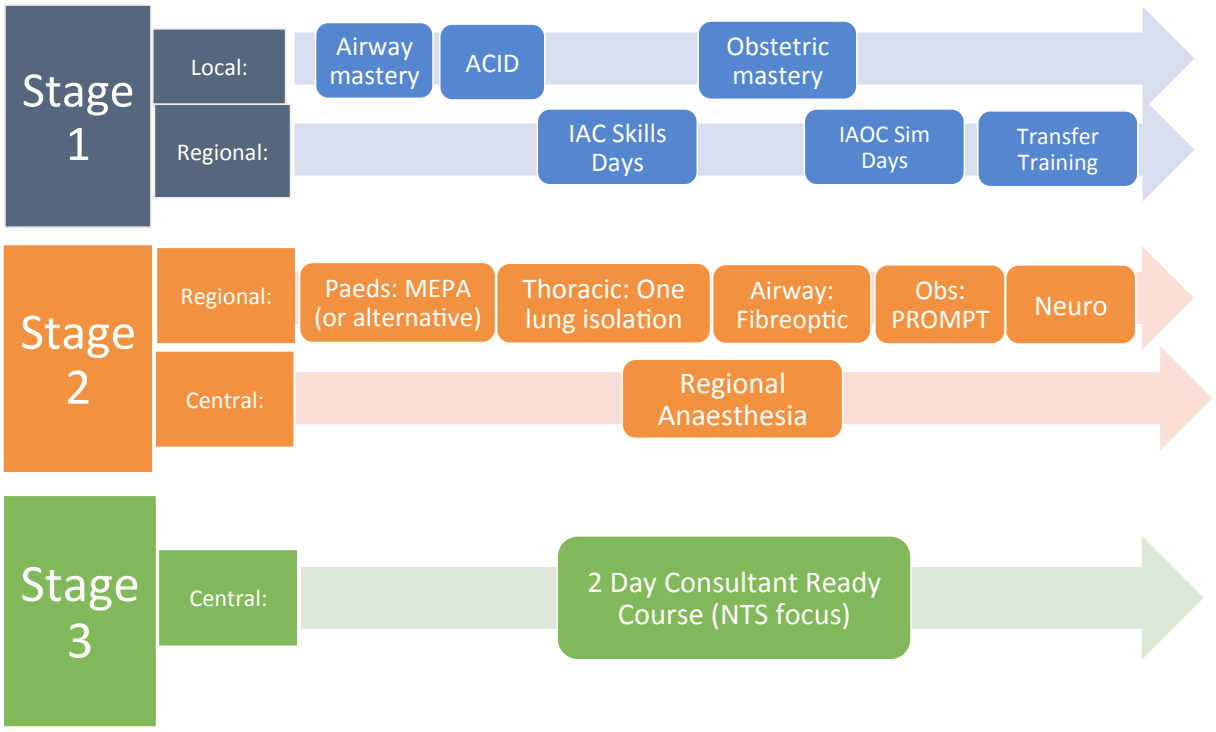
Type of Learning	Simulation Activity	Practical Considerations
Knowledge based: Factual knowledge such as learning the doses or mechanisms of action of anaesthetic drugs, or knowing the treatment of specific conditions	Probably not suited to simulation, there will be more efficient ways of teaching this such as tutorials, online learning, videos, etc	We should make sure that this knowledge component is covered before embarking on simulation. It will be inefficient and overly challenging for trainees if they turn up for simulation teaching without the knowledge base first!
Skills based: This includes practical skills such as central lines, laryngoscopy, regional anaesthesia, etc. It could also include individual skills such as taking an anaesthetic history, doing an airway assessment	Using techniques of deliberate practice such as "mastery learning" are proven, and well aligned with this type of learning. Simulation can give a degree of familiarity that will maximize efficiency and safety before embarking on supervised practice.	This should be "low fidelity" simulation initially. In other words, focused on the skill, without extrinsic distracting factors and pressures. Using equipment such as an airway head to teach airway skills initially, will be more efficient than a full manikin with monitoring attached and communication issues with the patient to contend with on top of the practical skill being taught.
Drills based: Sequencing skills together and focusing on the content/order, such as running through the ALS algorithm, or failed intubation drill.	Relatively "low fidelity" simulation scenarios can be used initially to allow people to talk/walk through these scenarios. The ACID course is an example of this type approach.	Some people will require more rehearsals than others to sequence these steps together correctly. Removing stressors and distractors initially will normally lead to people learning these skills faster. Low fidelity allows multiple walk throughs and a higher ratio of participants to faculty.
Performance based: Improving performance based behaviours such as decision making, task management and communication.	This normally requires more "immersive" types of simulation scenarios where the participants feel and behave like they would do in real clinical settings. Evidence suggests that a facilitated debrief is required in order for participants to improve at these skills.	This is resource heavy, and often requires a large amount of preparation and experienced faculty. To maximize efficiency, participants should attend this type of "high fidelity" or immersive simulation, already with the necessary knowledge/skills/drills training. Watching and reflecting on other people performing these scenarios is a good way of improving efficiency.

OVERVIEW

This overview gives a quick guide to potential simulation training activity as per the stages of the curriculum. Local training is defined as that delivered in the department that the trainee is currently attached to. Regional is within the East, West, South East or North region at a suitable simulation hub, and centrally is simulation delivered at one central location (although this could be rotated to different regions, year on year). A degree of flexibility will be required to balance the impact of travel on the disruption to departments and trainees, and the efficiency of running courses with a reasonable number of participants.

Decisions on location of training are based on a number of factors, including availability of resources, cost effectiveness and educational impact. Regarding educational impact, it was felt that early on in the training, trainees would benefit more from local and regional simulation activity to minimise variations in equipment and practice.

It may take some time, and there will likely be some changes and discussions before we agree and enable every trainee to attend all these simulation activities during their training. We have prioritised four key areas based on a needs assessment, but that does not mean that work in any of the other areas (or indeed some outwith these core activities) can not be shared, developed, piloted and start the work of seeking funding and practical arrangements that are required to deliver these across Scotland in a sustainable manor.



STAGE 1: 3 years indicative

Airway mastery

Local level airway mastery training available to all trainees starting Anaesthesia (including ACCS in their first anaesthetic attachment)
Example: https://das.uk.com/node/581
This can be categorized at the skills level of simulation, using low fidelity equipment.
Trainees and trainers have reported that following the Structured Training for Anaesthesia Novices (STAN) programme an efficient and evidence based way of learning airway skills at the start of their training: https://scschf.org/wp-content/uploads/sites/8/2018/06/STAN-Training-Manual.pdf

ACID

Anaesthetic Critical Incident Drills: https://scschf.org/product/anaesthetic-critical-incident-drills-teaching-package-acid
Internationally recognised and curriculum aligned training package based on low resource local level talk and walk through of anaesthetic critical incidents. Allows increased efficiency of learning and progress of the more

IAC Skills Days

A full day of drills type simulation for all anaesthetists with around 3 months of experience. Aligned to the IAC components of the curriculum, and including the management of failed intubation and of the "unknowns" from the AAGBI Quick Reference Handbook (QRH). See subsequent sections and appendix 1 for more details of an example course.

Obstetric mastery

Training of normal practise (ie not emergencies) in obstetric anaesthesia to prepare trainees at the start of their first Obstetric Anaesthesia attachment. Examples of local training days include Epidural and Spinal mastery and approaches to common obstetric practices. Knowledge and Skills level simulation. (Example course: https://www.med.scot.nhs.uk/simulation/the-mastery-programme/labour-epidural)

IAOC Sim Days

A full day of mainly immersive performance level simulation for trainees with around 2-3 months experience of Obstetric Anaesthesia. Aligned with the curriculum for IAOC and focussed on failed intubation and common obstetric emergencies. See further sections and appendix 2 for more details.

Transfer Training

A full day of transfer training simulation to prepare trainees at the end of their first year (indicative) or beginning of their second year prior to taking independent responsibility for inter and intra hospital transfers.
There are a number of example courses in Scotland, some of which feature pre learning (knowledge and drills learning) prior to kit familiarisation and immersive simulation experiences. One example is the Scottish Inter-Facility Transfer (ShIFT) programme.

STAGE 2: 2 years indicative

Paeds: MEPA (or alternative)

There are a number of examples of simulation training for paediatric anaesthesia across Scotland. Some of these are more skills and drills based, and some more immersive such as the Managing Emergencies in Paediatric Anaesthesia (MEPA) course: https://mepa.org.uk/. It is possible that low resource and local paediatric drill training could be incorporated into stage 1 to prepare trainees for these more immersive courses.

Thoracic: One lung isolation

A number of simulation courses exist or are under development in cardiothoracics. One example of a highly evaluated course running in Scotland is the one lung course https://www.aberdeenanaesthesia.org/index.php/education/courses/olta

Airway: Fibreoptic

A number of advanced airway courses focussing on skills and drills have been developed across Scotland. Some involve fibreoptics and videolaryngoscopy. There are also a number of part task trainers available to train dexterity in both these techniques.

Obs: PROMPT

Trainees with further experience of Obstetric Anaesthesia could benefit from multidisciplinary simulation training that focuses more on understanding the roles of the different team members and how best to communicate and work together effectively. Examples of this immersive simulation include the internationally recognised and evidence based PROMPT course: https://www.promptmaternity.org/

Neuro

Courses aligned with the curriculum and preparing trainees for common neuro emergencies have been run successfully in the UK and Scotland. Examples of this type of course include: https://www.onebrain.org.uk/

Regional Anaesthesia

Simulation is used to develop skills in regional anaesthesia through part task trainers and cadaveric models. A mastery approach to regional anaesthesia can and could be an evidenced based approach here. Given the expense and resources of these training models, a centralised model for this training (aligned to the curriculum) may be appropriate for Scotland.

STAGE 3: 2 years indicative

2 Day Consultant Ready Course (NTS focus)

It has been recognised that there is a lack of simulation training and courses specifically aimed at senior trainees, and aiding the transition to Consultant roles. Previously the Crisis Avoidance and Resource Management (CARMA) course was recognised as a highly evaluated course ran from the Scottish Clinical Simulation Centre and using the Anaesthetic Non-Technical Skills (ANTS) taxonomy[1]. We recommend developing and refining this material to bring it up to date with current clinical practice and training in NTS.

We would also be able to utilise resources and experiences from national and international courses based on the ANTS framework, such as the highly successful Effective Management of Anaesthetic Crises (EMAC) course from Australia and New Zealand, which is essentially an exit course for senior trainees in anaesthesia endorsed by their college.
https://www.anzca.edu.au/education-training/cme-courses-and-resources/emac-course

There are several reasons why we would support a centralised model for this type of simulation activity. Firstly it is resource heavy, and experience from the CARMA course has suggested that the equipment and faculty to run this type of training may be expensive and worth pooling across Scotland. Secondly, there are likely to be benefits in networking trainees and faculty across Scotland with this type of course. The experience of national simulation training programmes within surgery and medicine have demonstrated the benefit of a centralised "boot camp" approach, which we would hope to replicate[(2)].

1. Identifying and training non-technical skills for teams in acute medicine. R Flin, N Maran. BMJ Quality & Safety, 2004
2. Eight Years of Scottish Surgical Boot Camps: How We Do It Now. K Walker, V Blackhall et al. Journal of Surgical Education, 2020

PRIORITIES FOR FUNDING AND DEVELOPMENT

Needs assessment

The needs for further development and funding are based on the discussions with stakeholders as described in the introduction. This is likely to be an ongoing iterative process as we develop clarity on the availability and sources of funding. A priority has been given to the development of activity mandated by the Royal College curriculum as this could prevent trainees from progressing with their training if we fail to deliver this. Courses deemed to be of high educational impact, that are challenging to be delivered sustainably at a local level and have clear patient safety implications have also been prioritised.

Current priorities for Funding and Development

1. IAC Skills Day
2. IAOC Skills Days
3. Transfer Training (Stage 1 requirement)
4. 2 Day Consultant ready course (NTS focus)

See table 1 for more detailed extract from the curriculum.

Current Proposal for Priority 1: IAC Skills Days

It is a requirement for all trainees starting their first Anaesthetic attachment (including ACCS trainees from all parent specialties) to complete an Initial Assessment of Competency at around 3 months. This includes the structured management of critical incidents and failed intubations demonstrated through simulation. Whilst some of this type of simulation is already present across Scotland, there is a challenge with rotations and timings to make sure that all trainees have equity of access and are given the opportunity to attend.

Our current recommendation to achieve priority 1 is to run a regional critical incident training course. This would take place at the end of September (for those starting in August) and end of April (for those starting in February), be run over a full day and include pre learning based on the Quick Reference Handbook and ACID material.

As a backup for trainees that have a specific circumstance that means they cannot attend, we will either offer the opportunity to attend a date at a different region, or we will help support the local team to deliver these simulation workshops at a convenient time.

See appendix 1 for an overview of a potential example of this training day, that has been evaluated highly and details and outcomes published.

Current Proposal for Priority 2:

IAOC Sim Days

The curriculum and trainee focus groups confirms a clear need for simulation to prepare trainees new to Obstetric Anaesthesia (second year of training indicative). The curriculum and lived experience of trainees and supervising obstetric anaesthetists suggests that a focus on NTS in the management of emergencies is required.

The requirement to address NTS has led to the development of more immersive simulation activities. These have been developed with Obstetric Anaesthetic content experts. Various scenarios from courses across the UK have been reviewed and adapted in line with training needs to develop a potential course that is detailed in appendix 2, and has been evaluated highly.

Due to the more resource-heavy nature of this course (with higher expert faculty to participant ratios) and the timings of rotations across the year, several courses will be required to run at regional simulation hubs throughout the year. Ideally trainees should attend courses within their region (gaining from the benefit of using local equipment, guidelines and practice) but if a trainee cannot attend a course in the timeframe required, it should be possible to attend one in a different region.

Current Proposal for Priority 3:

Transfer Training

Prioritising this simulation activity was based largely on the recommendations of trainers and trainees, but also aligns with the curriculum. There is a clear need for this training based on the high stakes and often unsupervised nature of both inter- and intra-hospital transfers of critically unwell patients. Increases in required investigations, the need for subspecialty management and lack of hospital beds has also increased the number of transfers required across Scotland.

Trainees often expressed anxiety and concern about managing particularly inter-hospital transfers for the first time on their own, without training and familiarity with equipment. Given this concern and some variation in equipment, it could be beneficial to deliver this training regionally. Timing of this course from Consultant supervisors and trainees based on their need to undertake transfers was thought to be at the beginning of their second year of training. There are a variety of transfer training courses in the UK that have been run or are under development, some of which use tutorials alongside scenarios and are more drills based. However, given the concerns of trainees and the potential/need of moving fairly swiftly to isolated unsupervised practice in the back of a moving vehicle, we would recommend the use of immersive simulation. There are several examples of courses developed or under development across Scotland. One example is the Scottish Inter-Facility Transfer (ShIFT) course. This has been developed with extensive multidisciplinary consultation and includes constructively aligned pre-learning packages, and has been evaluated highly. See appendix for details.

Current Proposal for Priority 4:

2 Day Consultant Ready Course (NTS focus)

It was recognised that there was a perceived lack of simulation training in later years. Experienced consultants reflecting back on their training pointed towards the perceived benefit of the well-evaluated and published CARMA course. This two-day course has a focus on NTS in the management of anaesthetic emergencies and

uses carefully designed, immersive simulation to achieve these outcomes. This type of course also aligns well with the entrustable behaviors featured in the curriculum that can sometimes be challenging for trainees to evidence. In addition to these factors, there was also a concern that smaller numbers of cases during training (both due to the working hours and factors affected by the pandemic) may require a greater requirement for simulation to ensure trainees are Consultant-ready.

We recommend enhancing the material and scenarios already developed in the CARMA course, to bring it up to date with current practice and learning needs, and reflect the recent development in the Anaesthetic Non Technical Skills course to allow for pre-learning and a more efficient use of simulation faculty and resources.

This course requires immersive simulation, experienced faculty familiar with both simulation and non-technical skills and a high ratio of faculty to participants.

SUMMARY

We are early on in the development of our simulation strategy. However, we believe that we have the expertise within Scotland to deliver a comprehensive simulation programme for all trainees. We are open to advice and suggestions from all stakeholders on how to implement this successfully.

APPENDIX 1: IAC COURSE OVERVIEW EXAMPLE

IAC Simulation Day Logistics

Participants:

- Estimate of 28 participants (anaesthetic new starts) on the day, plus 5 ODP students
- We will split them into 5 groups of 5-6 anaesthetists and 1 ODP student.

Timings of day:

- 9am – 4.30pm
- Long lunch break to buffer if we are running a bit behind!
- See below table for more detail

Scenarios:

- The day will focus on drills of the 'unknowns' from the QRH and a failed intubation drill.
- Each workshop will last 1 hour, with 5 workshops in total.
- There will be:
  - A short introduction to the topic (they will know what the drill is from the start)
  - A walk-through drill with help from other participants (who can be using the QRH guide), using a pause and play approach
  - A performance of the drill in real-time by a different participant
  - Closing comments before moving on the next scenario
- The 5 workshops are:
  - Failed intubation and front of neck workshop
  - Cardiac arrest in theatre
  - Hypoxia and increased airway pressure
  - Hypotension/Hypertension/Tachycardia/Bradycardia
  - Hyperthermia/Raised CO2
- Scenarios will run in a carousel fashion, with groups rotating room every hour.

Pre-learning:

- Half-day lecture-based teaching to discuss key basic plan
- Video of managing a critical incident (work in progress)
- Reading list – QRH, ALS guide, DAS guidelines, eLFH modules

Equipment:

- 2 mannequins plus airway mannequins at SJH
- Anaesthetic machine in each scenario room
- Airway trolley needed for some scenarios (failed intubation, hypoxia)
- FONA trainers and kit
- Print outs of each QRH guide
- Full equipment list is within each scenario template on teams

	Education Centre Room	Simulation Suite	Theatre 11	Theatre 12	Recovery 1	Recovery 2
0830 – 0900	Registration	Faculty meeting				
0900 – 0915	Introduction					
0915 – 0945	Team exercise	Team exercise				
0945 – 1000	Break					
1000 – 1015		Introduction to mannequin and anaesthetic machine	Introduction to mannequin and anaesthetic machine	Introduction to mannequin and anaesthetic machine	Introduction to mannequin and anaesthetic machine	Introduction to mannequin and anaesthetic machine
1015 – 1115		Failed intubation/FONA GROUP A	Cardiac arrest GROUP B	Hypoxia/Airway Pres GROUP C	Hypertension, tachycardia, etc GROUP D	Hyperthermia/high CO2 GROUP E
1115 – 1215		Failed intubation/FONA GROUP E	Cardiac arrest GROUP A	Hypoxia/Airway Pres GROUP B	Hypertension, tachycardia, etc GROUP C	Hyperthermia/high CO2 GROUP D
1215 – 1315	Lunch					
1315-1415		Failed intubation/FONA GROUP D	Cardiac arrest GROUP E	Hypoxia/Airway Pres GROUP A	Hypertension, tachycardia, etc GROUP B	Hyperthermia/high CO2 GROUP C
1415 – 1515		Failed intubation/FONA GROUP C	Cardiac arrest GROUP D	Hypoxia/Airway Pres GROUP E	Hypertension, tachycardia, etc GROUP A	Hyperthermia/high CO2 GROUP B
1515-1615		Failed intubation/FONA GROUP B	Cardiac arrest GROUP C	Hypoxia/Airway Pres GROUP D	Hypertension, tachycardia, etc GROUP E	Hyperthermia/high CO2 GROUP A
1615 – 1630	Closure					

APPENDIX 2: IAOC EXAMPLE COURSE OVERVIEW

Overview of Obstetric Simulation Simulation Day for CT2s

Aims

The main aim of this simulation day is to provide rehearsal and training as described in the curriculum in these areas (direct quotes from the curriculum):

- Rehearse the management of common obstetric emergencies
- Rehearse management of failed intubation drill
- Demonstrates ability to provide general anaesthesia for caesarean section
- Demonstrates management of failed intubation drill in an obstetric patient according to DAS guidelines

"Fidelity should permit ability to rehearse in context and demonstrate technical and non-technical skills "

Overview of training and schedule

Pre course material will be circulated to participants to ensure familiarity with the material.

Participants will run through lower fidelity airway drills, followed by more immersive obstetric emergency scenarios with a focus on technical and non-technical skills.

Airway Drills: These will use strategies such as pause and play, pause and rewind in order to make sure all participants have a clear idea of the process followed for giving a general anaesthetic for emergency Caesarean Section, and for managing failed intubation in this setting. Groups of 3 participants, all having a chance to run through the drill.

Obstetric emergencies: These will focus on the technical and non-technical skills required in managing obstetric emergencies. These scenarios will be more immersive and there will be 2 participants in the "hot seat" with the other 4 participants watching and contributing to the debrief and thus learning from the experience too.

Equipment: A more detailed list of equipment for each scenario will be provided in the scenario overview, but two simulation manikins will be required (Sim man and Sim mum) with monitoring and anaesthetic machines and set up as a standard Obstetric Theatre.

We will try and set up locations the day before as much as possible to reduce workload in the morning.

Timetable:

Time	Sim Suite	Sim Room 2	Sim Room 1	Comments
08:30-09:00	Faculty meet and ensure set up			
09:00-09:20	Participants arrive and introductions			
09:20-10:00		Straightforward GA for CS	Straightforward GA for CS	In groups of 3/4
10:00-11:00		Failed intubation drill	Failed intubation drill	In groups of 3/4
11:00-11:20	**Coffee**			
11:20-12:20		MOH Scenario		2 hot seat participants
12:20-13:10	**Lunch**			
13:10-14:10		LA toxicity leading to cardiac arrest		2 hot seat participants
14:10-15:10		High spinal		2 hot seat participants
15:10-15:30	coffee			
15:30-16:30		Eclampsia		2 hot seat participants
16:30-16:40	close			

APPENDIX 3: SHIFT COURSE OVERVIEW

Shift Course Outline	
0900 - 0915	*Introduction* Housekeeping Educational environment
0915 - 0945	*Introduction to the simulated environment* SimMan 3G Monitors Anaesthetic machine Airway trolley
0945 - 1015	*Equipment and Packaging* The CCT6 transfer trolley The Oxylog 3000+ Packaging
1015 - 1100	*Interior and contents of a frontline ambulance* Seating Role of the paramedic Equipment
1100 - 1200	*Scenario 1* Indications for intubation Roles Situational Awareness
1200 - 1300	*Scenario 2* Referral and communication Planning Packaging
1300 - 1330	Lunch
1400 - 1445	*Scenario 3* Go - No go decisions Level 3 SA Safety in moving ambulances
1445 – 1530	*Scenario 4* Limitations of monitoring Level 2 SA Slow down? Speed up?
1530 – 1615	*Scenario 5* Times of risk Diversion Maintaining SA
1615 – 1700	*Scenario 6* Handover Distractions Locus of control
1700	*Summary, Close*