Session 2: Lessons from the evolution of competence based approaches to regulatory function
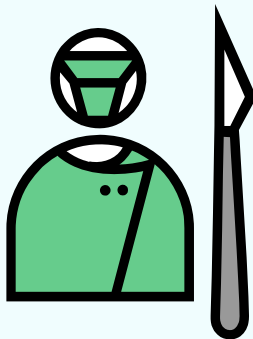
Keynote: Rhona Flin
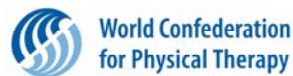
Safe in their Hands?
Non-Technical Skills and Competence Assessment

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University of Aberdeen

WHPRC, Geneva, 18th May 2014

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Dr Harold Shipman family doctor convicted of murdering 215 of his patients

- Dame Janet Smith *Shipman Inquiry 5th Report* (2004)
- *'consider the approaches taken by industry to maintain and assure professional standards of job performance to meet regulatory standards'*

'Safe in their Hands?' competence assessment in high risk industries

- Three 'high risk' industries in UK selected
  - Civil aviation
  - Nuclear power generation
  - Offshore oil and gas production

- Report to Department of Health, England – Flin (2005) '*Safe in their Hands?*'
  - Available on www.abdn.ac.uk/iprc

Method

- Semi-structured, face to face interviews
  - Regulators
    - CAA
    - HSE Nuclear Installations Inspectorate
    - HSE Offshore Safety Division
  - Industry
    - Two air operators
    - Two oil companies
   - One nuclear power company

Interview topics

- Identify target group
- Relevant legislation
- Role of the regulator
- Licence checks
- Standards of competence
- Competence assurance systems
- Other performance scrutiny mechanisms/ safety monitoring systems

Civil aviation

- Well established, accepted system
  (ICAO 1944)
- Annual licence check by CAA approved examiner
- Six monthly Operational Proficiency Check
- Assesses technical and non-technical skills
- Type Rating Examiners have to be qualified as Type Rating Instructors and as TRIs for Crew Resource Management (non-tech skills)
- TREs are assessed and revalidated every 3 years by RETREs

Nuclear Power
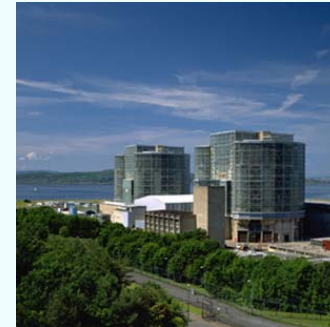
- Sites are licensed
- Unit Desk Engineers (control room operators), CR Supervisors, Shift Charge Engineers
- 'Duly Authorised Persons'
- Standards of competence
- Two yearly simulator assessment (tech <u>and non-technical skills</u>) plus interview
- Company appraisal system

Offshore Oil

- Safety case legislation for installations
- Companies' competence assurance systems e.g. for offshore managers
- Defined standards
- Three year assessment of emergency response skills - qualified assessors
- Six monthly appraisal
- Monthly performance reviews/ targets
- Non-technical skills now being introduced

Transfer caveats: industry/ healthcare

High risk industries have:
- Specific organisational cultures
- Strong management hierarchies
- Risk consequences for workers
- Size of target population
  - Much larger in healthcare
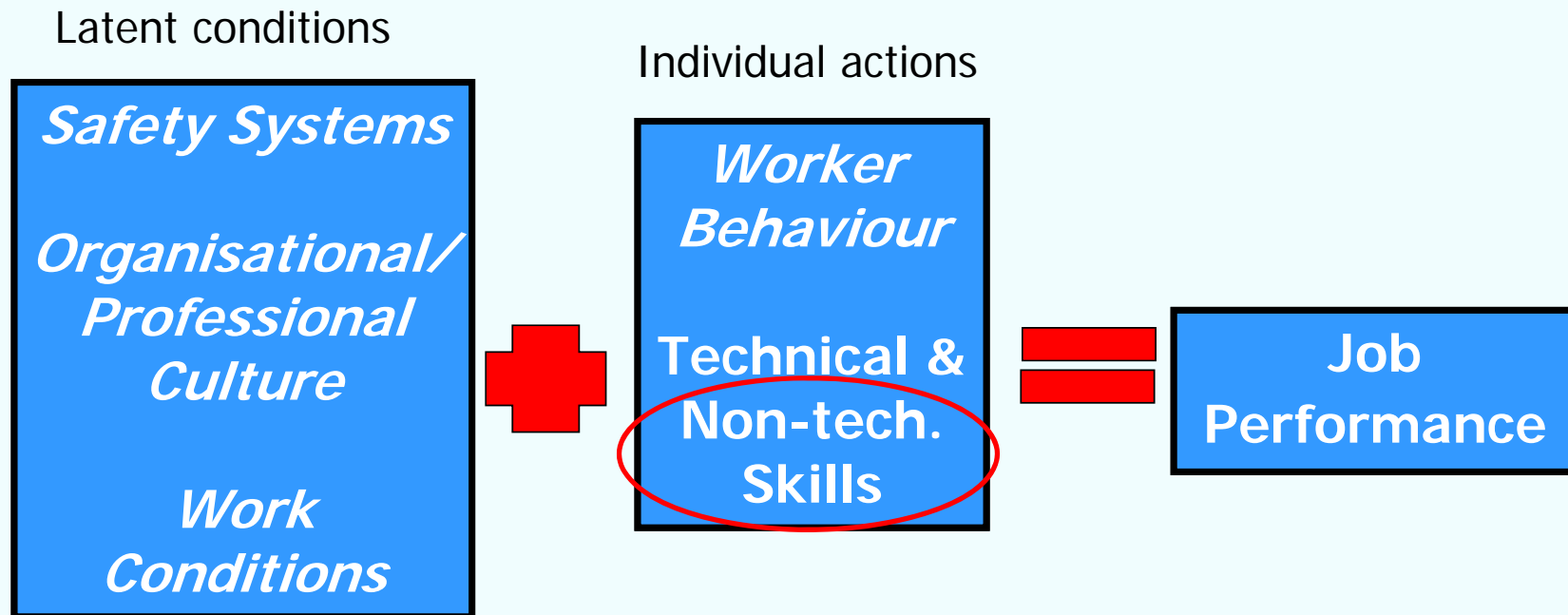- Standard operating procedures

General principles: higher risk industries

- Independent Regulators
- Regular, confirmatory proficiency checks
  - not a default to positive
- Standards of competence
- Trained, accredited assessors
- Non-technical skills
- Management of failure
- Use of simulators
- Physical health checks
- Link competence assurance to safety

Focus on non-technical skills

- Formally trained and assessed in aviation and nuclear industries

- Cognitive and social skills to reduce error/ enhance safety
  - e.g. decision making, situation awareness, team co-ordination, leadership

- Behaviour rating systems eg NOTECHS for pilots

- These have now been introduced for anaesthetists (ANTS), surgeons (NOTSS), emergency physicians, scrub nurses (SPLINTS)

Safe, Efficient Job Performance

Latent conditions

Individual actions

Safety Systems

Organisational/ Professional Culture

Work Conditions

Worker Behaviour

Technical & Non-tech. Skills

Job Performance

Tenerife accident (1977)

Two Boeing 747s crashed into each other on the runway - 583 people killed

Causes: conflict resolution, assertiveness, communication, situation awareness, stress
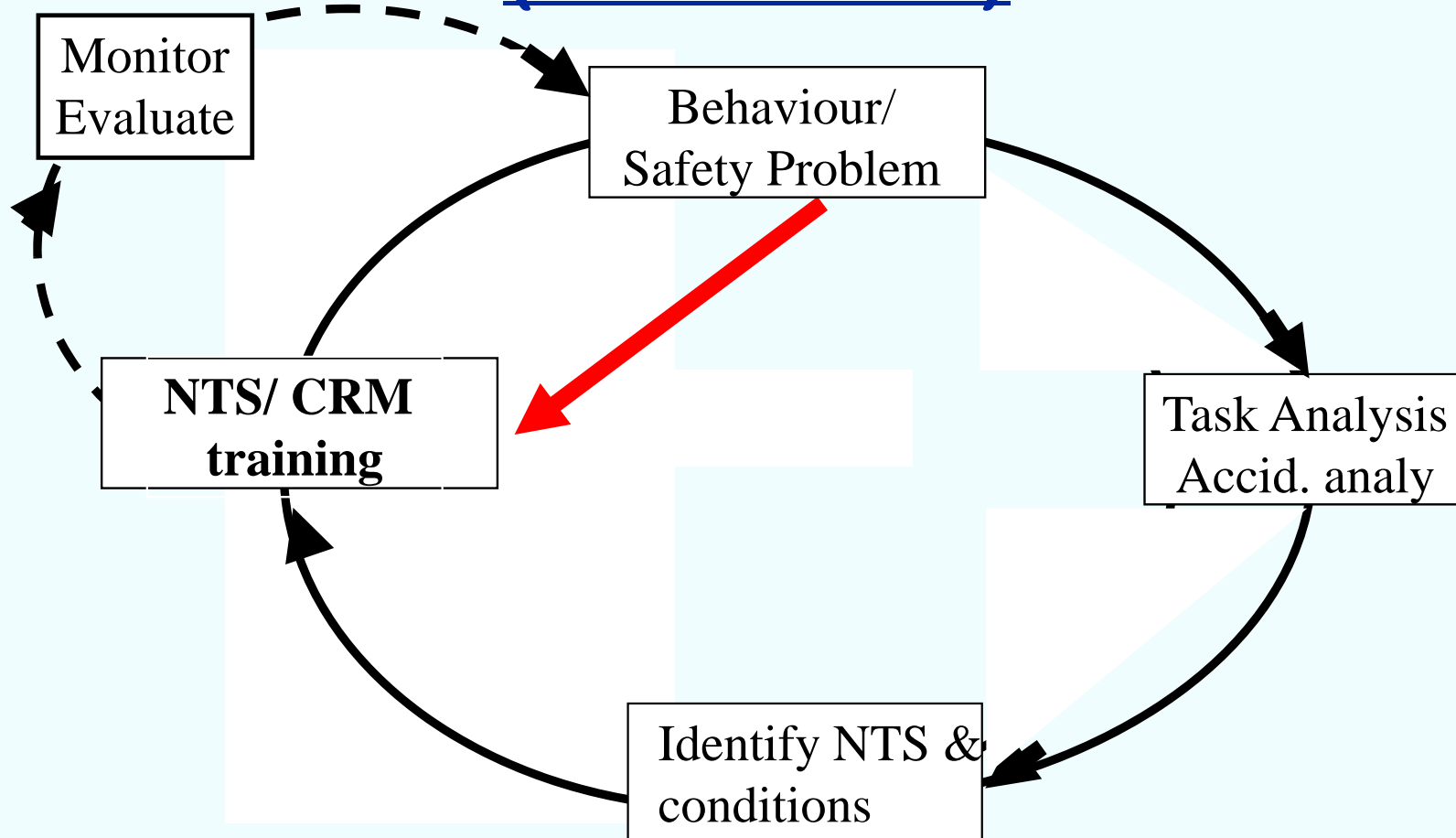i.e. non-technical skills

Closing the NTS Loop

Behaviour/
Safety Problem

Task Analysis/
Accid. analys

Identify NTS &
conditions
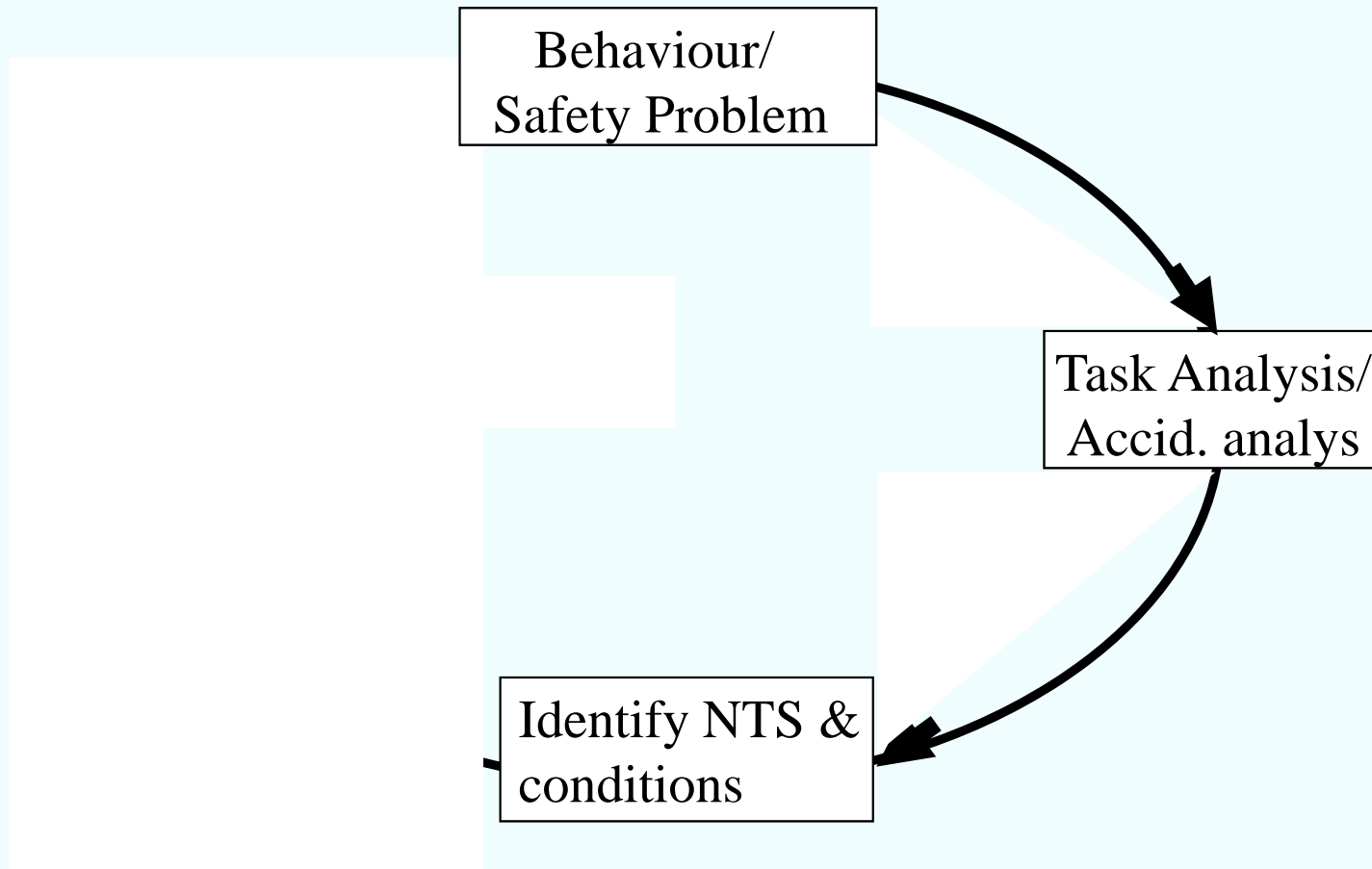
Closing the NTS Loop (aviation)
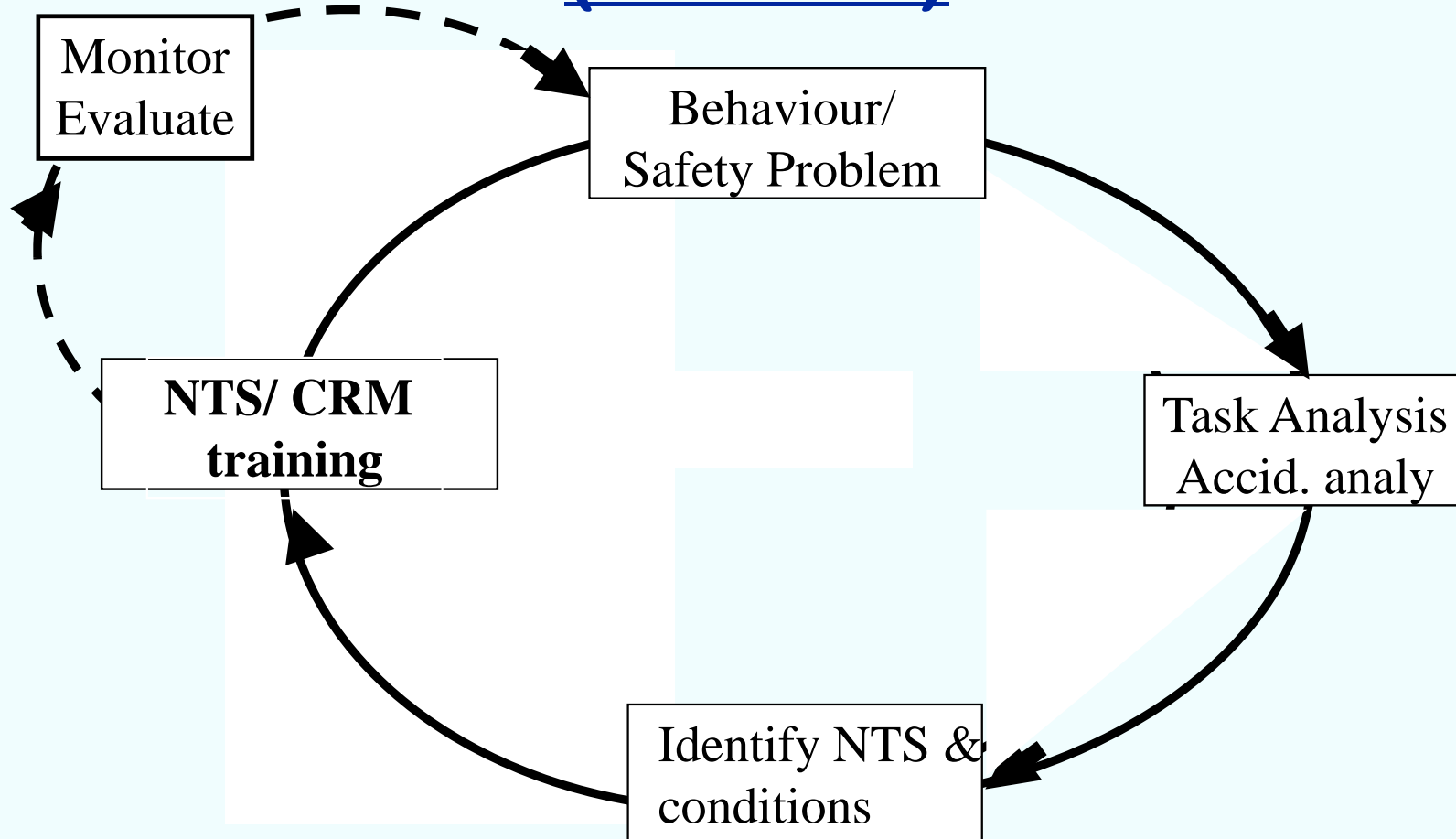
Closing the NTS Loop (healthcare)

Identifying Pilots' Non-Technical Skills

- Task analysis from 1979
  - Flight deck or simulator observations
  - Interviews with pilots
  - Surveys of pilots' attitudes, experiences
  - Confidential safety reporting systems
  - Accident analysis, especially analysis of cockpit voice recorder

A 'Black Box' for clinical units?
What would be on your voice recorder?

" . . . . "

" . . . . "

Voice recorder for your clinical area?

"My way is much quicker…."

"Did she say four..?"

"No-one follows that procedure…"

"I've done this hundreds of times.."

"We need to get this case done…"

"I knew that was going to happen…"

Pilots' Non- Technical Skills

- Term non-technical skills first used in European civil aviation (1990s).

Non-technical skills are the cognitive and social skills that complement technical skills, and contribute to safe and efficient task performance.

Aka: Crew Resource Management (CRM) skills

Formally trained and assessed in aviation and nuclear industries

Non-Technical/ CRM Skills

- Situation Awareness
- Decision Making
- Leadership
- Team Work

- Communication
- Managing stress and fatigue
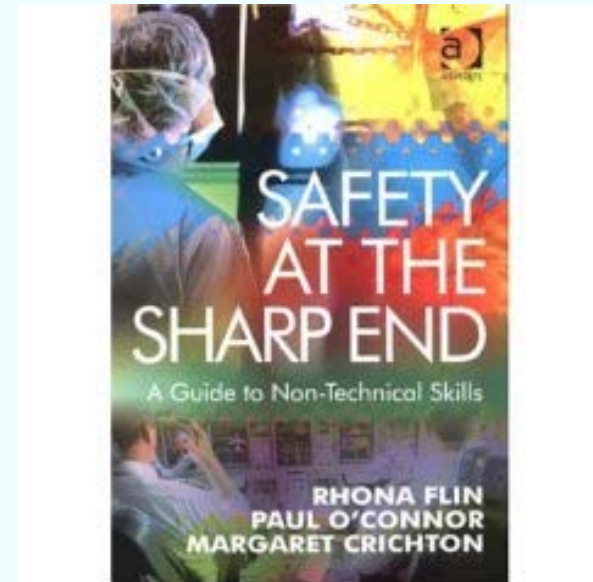
Crew Resource Management (NTS)

- Based and updated on human factors research identifying behaviours (NTS) critical for safe performance

- 2-3 days basic training (lectures, videos, role-plays, etc.) plus annual recurrent training mandated by CAA (UK)

- Skills practised with feedback in simulator (LOFT)

- Regular formal assessment of non-technical skills for UK pilots mandated by CAA (2004)

- NTS Trainers/ examiners must be assessed as competent

[Pilots' Non-Technical Skills](#)

NOTECHS system (1998)

Pan-European

Behaviour rating method to assess a pilot's non-technical (CRM) skills.

Recommended by JAA/ CAA

Adopted by some airlines, adapted by others.

Flin et al (2003) *Human Factors & Aerospace Safety, 3, 95-117*

Nationaal Lucht- en Ruimtevaartlaboratorium
National Aerospace Laboratory NLR

NLR-CR-98443

NOTECHS
The evaluation of non-technical skills of multi-pilot aircrew in relation to the JAR-FCL requirements

Final report

J.A.G. van Avermaete and E.A.C. Kruijsen (Editors)
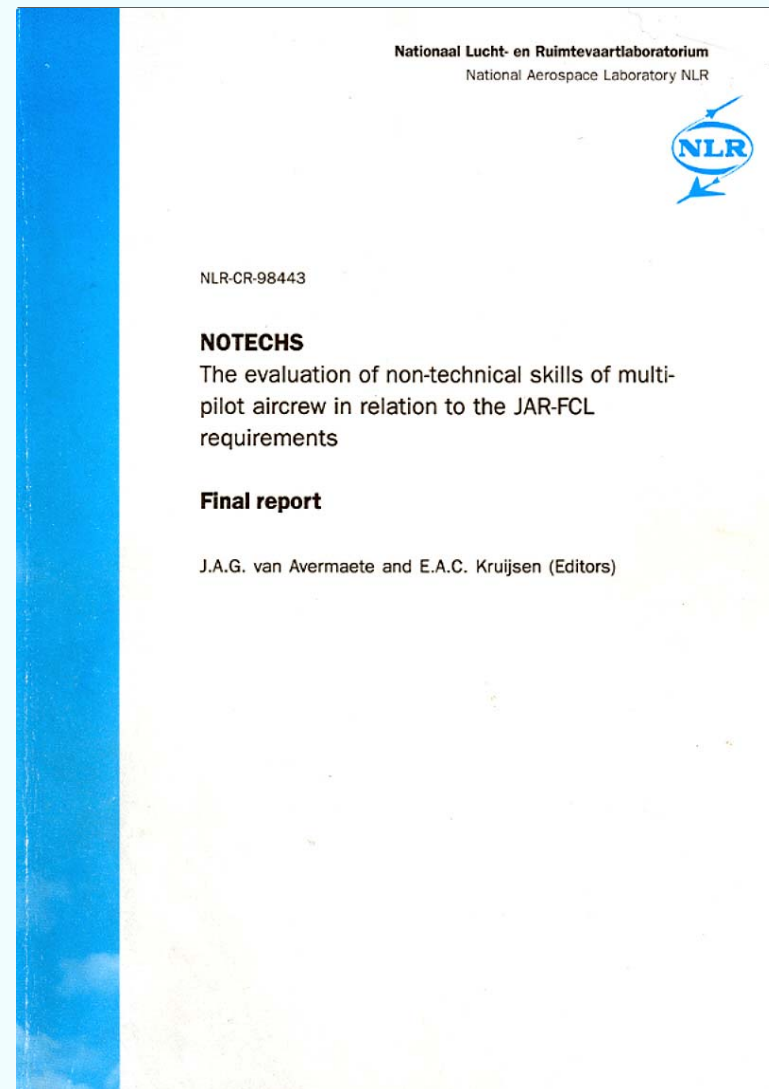
Relevance for the operating theatre?

Relevance to OR?

Research has shown adverse events in surgery primarily caused by failures of teamwork, judgement:

– Gawande et al (2003; 2004) – insurance claims in the US

– Sevdalis et al (2007) – interruptions in theatre

– Way et al (2003) – 97% of bile duct injuries had perception failures

– Wilson et al (1999) Communication breakdown in 43% of surgical errors

Positive outcomes for the team and patient through good non-technical skills

– Edmondson (2003) – effective leadership

– Healey et al (2004) – observing teamwork in surgery

Yule, et al., (2006). Non-technical skills for surgeons: a review of the literature. *Surgery, 139, 140-149*

Non-technical skills for doctors in OR

"The cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance"

- Communication
- Teamwork
- Leadership
- Situation awareness
- Decision making
- Managing stress and fatigue

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Scottish Clinical Simulation Centre

Framework for Observing and Rating
Anaesthetists' Non-Technical Skills

TEAM WORKING

TASK MANAGEMENT

DECISION MAKING

SITUATION AWARENESS

**Anaesthetists' Non-Technical Skills
(ANTS) System Handbook v1.0**

UNIVERSITY OF ABERDEEN

ROYAL COLLEGE OF SURGEONS OF EDINBURGH

NHS Education for Scotland

The Non-Technical Skills for Surgeons (NOTSS)
System Handbook v1.2

TEAMWORK

SITUATION AWARENESS

LEADERSHIP

DECISION MAKING
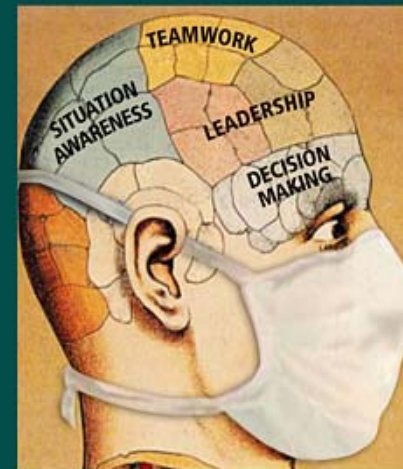
Structuring observation, rating and feedback of
surgeons' behaviours in the operating theatre

SPLINTS development method

Task analysis (2008-2009)

- Literature, survey, observations, interviews: nurses and surgeons
- List of skills emerged

Taxonomy design and development (2010)

- Skills sorted by panels of nurses
- Taxonomy and behavior markers written

Evaluation (2011)

- Reliability - using video scenarios (n= nurses)
- Usability testing in theatre

Implementation (2012 -)

- SPLINTS debriefing in theatre and theatre simulators
- Develop SPLINTS curriculum

Method – task analysis

- Review of literature n=13 papers
- Observations n=24;
- Interview: nurses n=25; 3 hospitals
  mean experience 15yr; SD 9.38; range 2-33yr
  consultant surgeons n=9; 4 hospitals

Mitchell, L. & Flin, R. (2008) *Journal of Advanced Nursing, 63*, 15-24

Nurses' interview data

" *You just know when something is going wrong, it's either…
you can physically see that something's happened but
sometimes you can't see. You can just recognise the
surgeon's body language or see them clenching their jaw
.. that things are not going well.*"

"*…when they [surgeons] ask for something and you give
them what you think it is that they need and it's not the
thing they said but you know it is what they actually
want.*"

"*The surgeon said "give me the buzzy thing.. *"

Surgeons' interview data

- if I'm really concentrating hard on a task I'll forget the names of instruments I use every day

- a lot of what you need arrives in your hand without you actually having got as far as asking for it, it's almost telepathy, it's smooth, it runs

- they [scrub nurses] need to have the ability to be quite focused on the procedure and not be distracted by what else is going on

Coding Interview Transcripts

How do you keep track of the status of an operation?

You know by the surgeon's voice, by his actions. Just by what he asks for, you know if he's come upon things he's not expecting(1). You have a procedure you follow and there are certain things you expect to happen(2) so you just go on and you go on and then when something isn't right, you know it isn't right because, if you can't see, which often you can't, he'll ask for something you're not expecting(3). At that point he usually says something to his assistant or to the anaesthetist(4) so you just gauge it. Or perhaps it's the anaesthetist who has recognised something on the monitor, and you can hear it sometimes, different to the way it should be(5). It depends on the experience of the surgeon too, because if you have an inexperienced surgeon when things like that change they'll maybe get a bit hot under the collar and you've got to be the one to keep it calm(6). The junior surgeons do look to you(7), mostly although some of them can get a bit stroppy in his voice and in his manner, those who want to remain in charge and you think, right, things aren't going to plan here. But most of them will say something like, "what do they normally use here?" or "what does Mr X use here?" so they look to you to tell them that(8). So, that's when you know that it's not going clockwork.(9)

Cognitive skills e.g. situation awareness, decision making
Social/ Interpersonal skills e.g. communication, teamwork, leadership
Task Management skills e.g. planning and preparation, prioritising
Stress/Fatigue management skills

Emerging skill set....

Literature review

communication, teamwork, situation awareness

No leadership or decision making

Interviews (25 nurses, 9 consultant surgeons)

communication, teamwork, situation awareness, task management, coping with stress

Less: leadership, decision making, managing fatigue

Developing the SPLINTS framework
Mitchell, Flin et al (2013)

- Panels of experienced theatre nurses n=4;

  from 3 Scottish hospitals

- Reduced original list from 7 categories containing 27 elements to 3 categories with 9 elements

- Taxonomy guidelines followed;

  - observable behaviours

  - generic to all surgical specialities

  - simple structure; easy to use in theatre

- Provided labels/ examples of good and poor observable behaviours to describe those skills

The SPLINTS framework
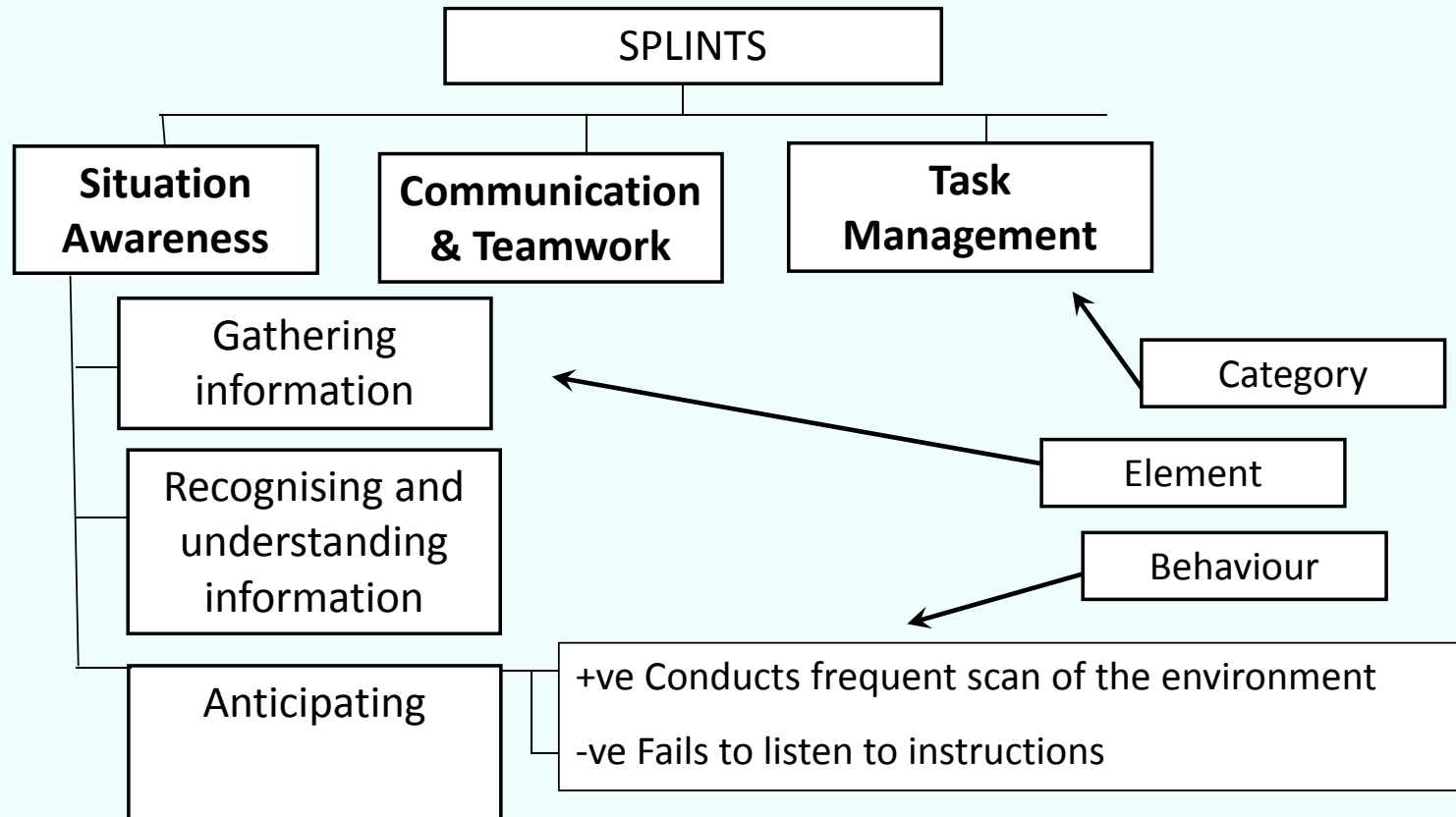
SPLINTS taxonomy

Category	Element
Situation Awareness	•Gathering information •Recognising and understanding •Anticipating
Teamwork and Communication	•Acting assertively •Exchanging information •Co-ordinating with others
Task Management	•Planning and preparing •Providing and maintaining standards •Coping with pressure

SPLINTS rating form v1.0

Hospital .... Trainer Name .... Date ....

Junior Name .... Operation ....

Category	Category rating*	Element	Element rating*	Feedback on performance and debriefing notes
Situation Awareness		Gathering information		
		Recognising and understanding information		
		Anticipating		
Communication and Teamwork		Acting assertively		
		Exchanging information		
		Co-ordinating with others		
Task Management		Planning and preparation		
		Providing and maintaining standards		
		Coping with pressure		

* **1** Poor; **2** Marginal; **3** Acceptable; **4** Good; **N/A** Not Applicable

1 Poor	Performance endangered or potentially endangered patient safety, serious remediation is required
2 Marginal	Performance indicated cause for concern, considerable improvement is needed
3 Acceptable	Performance was of a satisfactory standard but could be improved
4 Good	Performance was of a consistently high standard, enhancing patient safety; it could be used as a positive example for others
N/A	Not Applicable

Task analysis

Systematic review of nursing and psychology literature Mitchell & Flin (2008) *Journal of Advanced Nursing, 63*, 15-24

Unstructured observations of scrub nurses on task

Study 1 - Interview study Mitchell, Flin, Yule et al (2012) *International Journal of Nursing Studies*
Semi-structured interviews with scrub nurses & surgeons
Analyses of interview data to extract non-technical skills for scrub nurses

Study 2 - Develop the non-technical skills taxonomy
Panels of expert theatre nurses discuss and refine skills taxonomy
Preliminary skill set produced with examples of poor and good observable behaviours for the identified skills

Study 3 – Reliability testing of rating system
Record simulated scenarios showing scrub nurse behaviours
Nurse experts rate nurse behaviours displayed in scenarios to test reliability and psychometric properties of rating system

Adapted from Gordon (1994)

Testing the SPLINTS scale

- Record simulated scenarios to test prototype SPLINTS rating system

SPLINTS reliability Study 3 Method

Full day sessions; n=7
Scottish teaching hospitals; n=5
Experienced scrub practitioners; n=34

Basic human factors training including introduction to non-technical skills

Detailed input on SPLINTS taxonomy including definitions and behavioural markers to guide ratings of good and poor performance

Inter-rater agreement (r_{wg}) Element level

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Mean
1. SA								
Element 1	0.7	0.75	0.53	0.88	0.85	0.46	0.67	0.69
Element 2	0.7	0.78	0.51	0.91	0.88	0.48	0.7	0.71
Element 3	0.69	0.8	0.64	1	1	0.41	0.59	0.73
2. C&TW								
Element 1	0.7	0.73	0.61	0.91	0.82	0.5	0.65	0.7
Element 2	0.66	0.75	0.6	0.88	0.84	0.58	0.69	0.71
Element 3	0.72	0.76	0.51	0.91	0.86	0.46	0.65	0.7
3. TM								
Element 1	0.64	0.79	0.53	0.91	0.91	0.49	0.6	0.7
Element 2	0.64	0.74	0.55	0.85	0.83	0.51	0.5	0.66
Element 3	0.64	0.75	0.39	0.82	0.73	0.58	0.67	0.65
Scenario Mean	0.68	0.76	0.54	0.9	0.86	0.5	0.64	

Test results

- Acceptable ratings
- Better agreement at the category than element level
- Scenario differences
- Nurses generally positive about the system
- Need training to use system

SPLINTS Papers

SPLINTS interest

www.abdn.ac.uk/iprc/splints

- Australia
- Canada
- China
- Denmark
- England
- Italy
- Japan
- Kenya

- Korea
- Majorca
- Norway
- Scotland
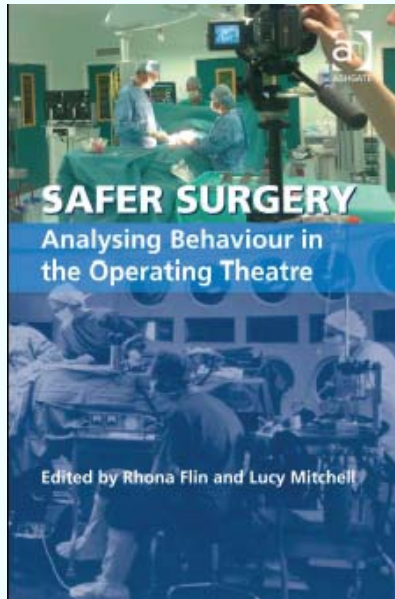- Singapore
- Sweden
- Switzerland
- USA
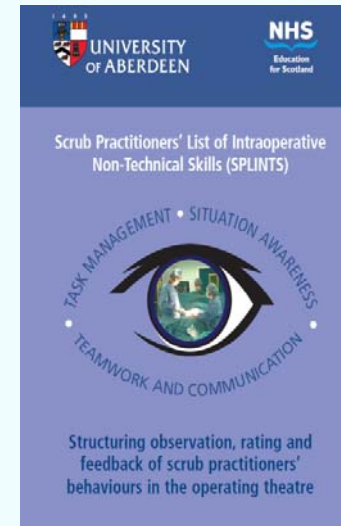
Uses for SPLINTS

- Provides a common language/terminology for discussing non-technical skills/ issues

- Assist training and assessment of non-technical skills in junior scrub staff

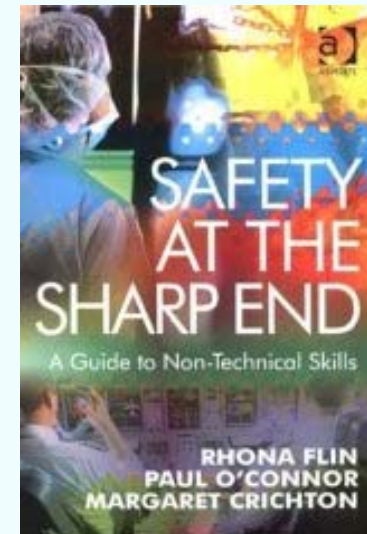- A structured framework to identify/ rectify ongoing training needs
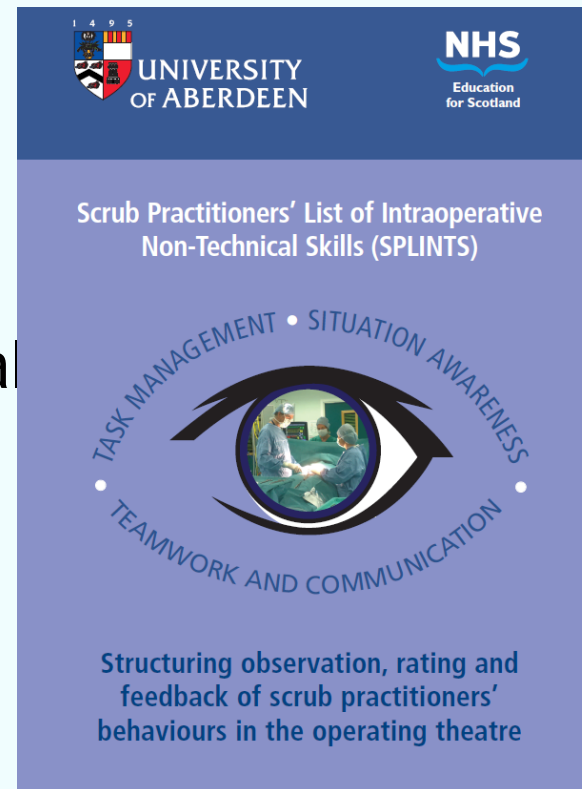
Further reading on NTS

Flin & Mitchell (Eds) (2009)

Farnham: Ashgate

Flin, O'Connor & Crichton (2008),

Aldershot: Ashgate

Professional issues

- Ab initio education of NTS concepts
  - *Cf Human Performance Limitations for Pilots*
- Training NTS
  - Qualification of NTS trainers
  - Single discipline before multi-discipline?
- Competence assessment
  - Qualification of NTS assessors
  - *Cf CRM instructors/ examiners in aviation*

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Further information

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- www.abdn.ac.uk/iprc

  lists of projects and papers and reports