

Training for Learning Agents

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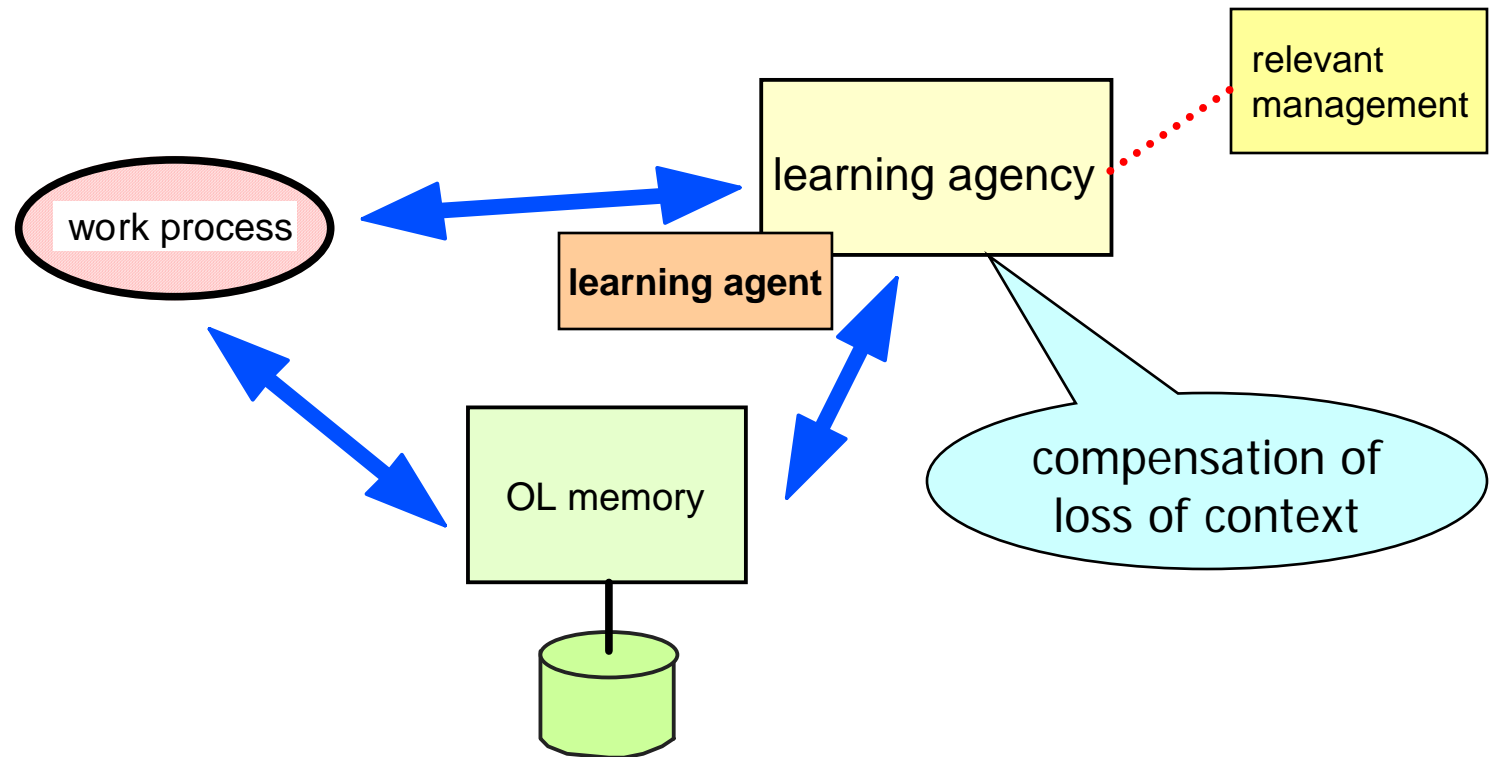
Warwick Workshop
8 April 2008

Introduction

- ◆ ongoing work in LUMC on Organisational Learning from critical patient safety experiences
 - Pilot 1: neonatology (2006); Pilot 2: children and youth care centre (2007-'08)
- ◆ Setting up OL processes { | OL principles }
 - Organisational Learning needs to be organised!
- ◆ Preparing Learning
 - Learning Agency
 - Learning Agents



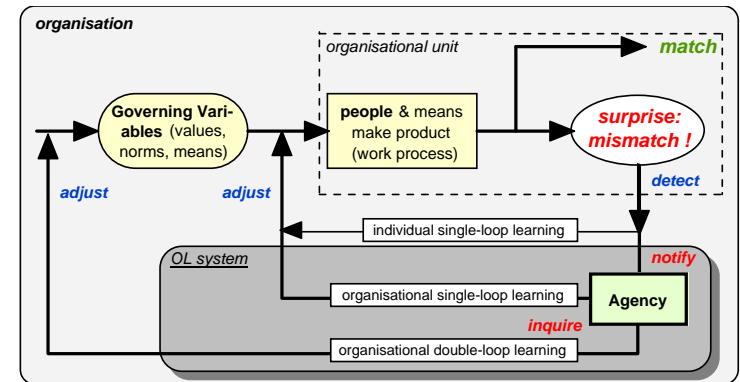
Basic components in processes of Organisational Learning: SOL-model



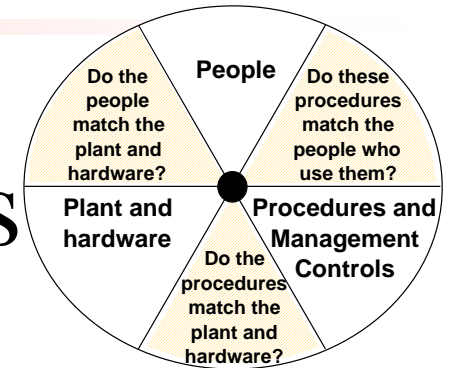
...needs to be organised

Learning Levels

- ◆ **Individual** (single loop)
 - individual change of theory-in-use
- ◆ **Organisational Single loop**
 - within span of control of unit management
- ◆ **Organisational Double loop**
 - beyond span of control of unit management
 - unit-governing variables => unit must adapt
- ◆ **Deuterolearning**



Questions leading to Lessons



- ◆ What are the structural factors in incident
 - people / apparatus / procedures / context
- ◆ Which of these can be influenced or resolved by unit management ...
 - with little/much effort
 - in *earlier phase* of patient throughput in BPM
- ◆ Select factors & formulate *recommendations* as lessons-to-implement for unit management

Training of Learning Agents

of Learning Agencies in OL context

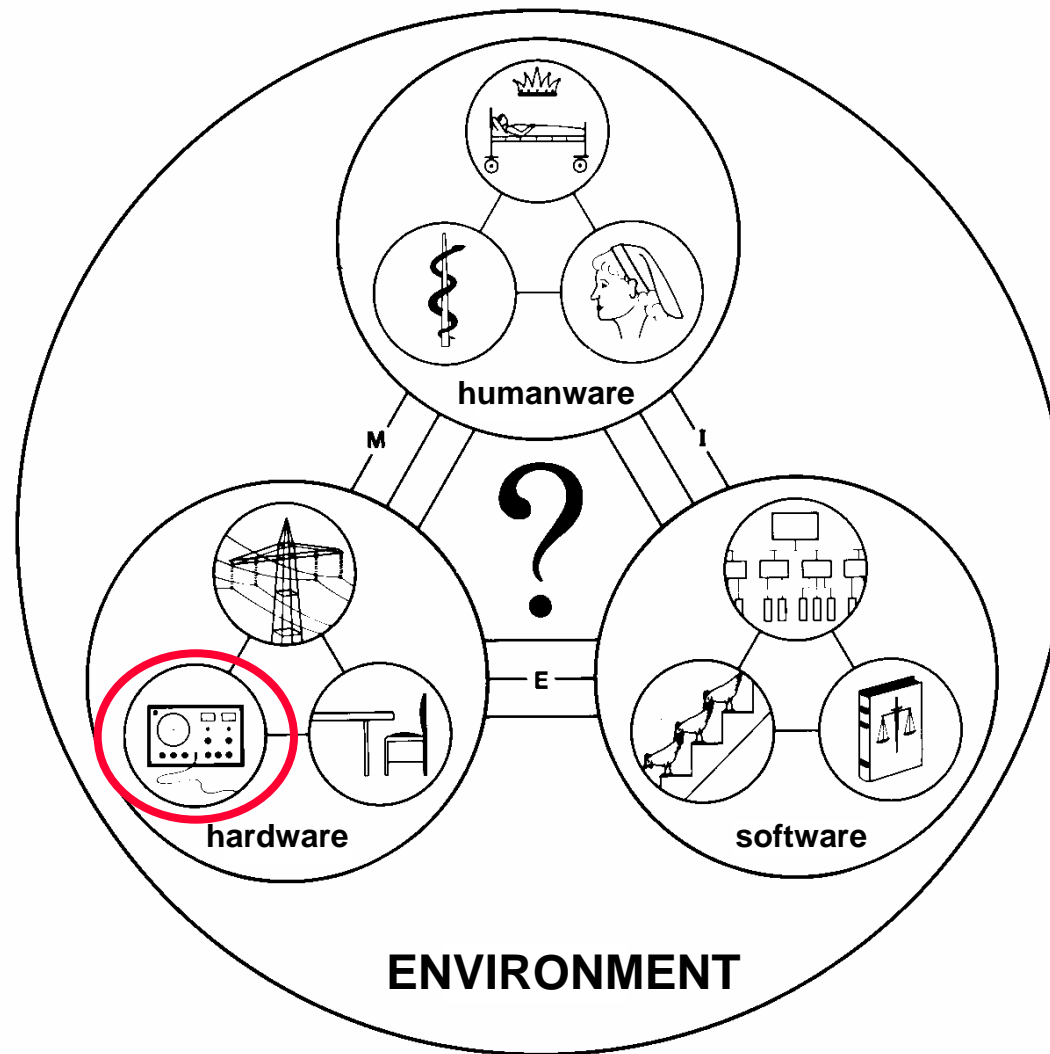
◆ Contents of training

- WHAT is there TO LEARN? Patient Safety: OR!
- Methods for incident reconstruction:
 - ECFA+: events and conditional factors analysis
 - 3CA (going into root cause analysis)
- Handling of loss of context (notification & lessons)

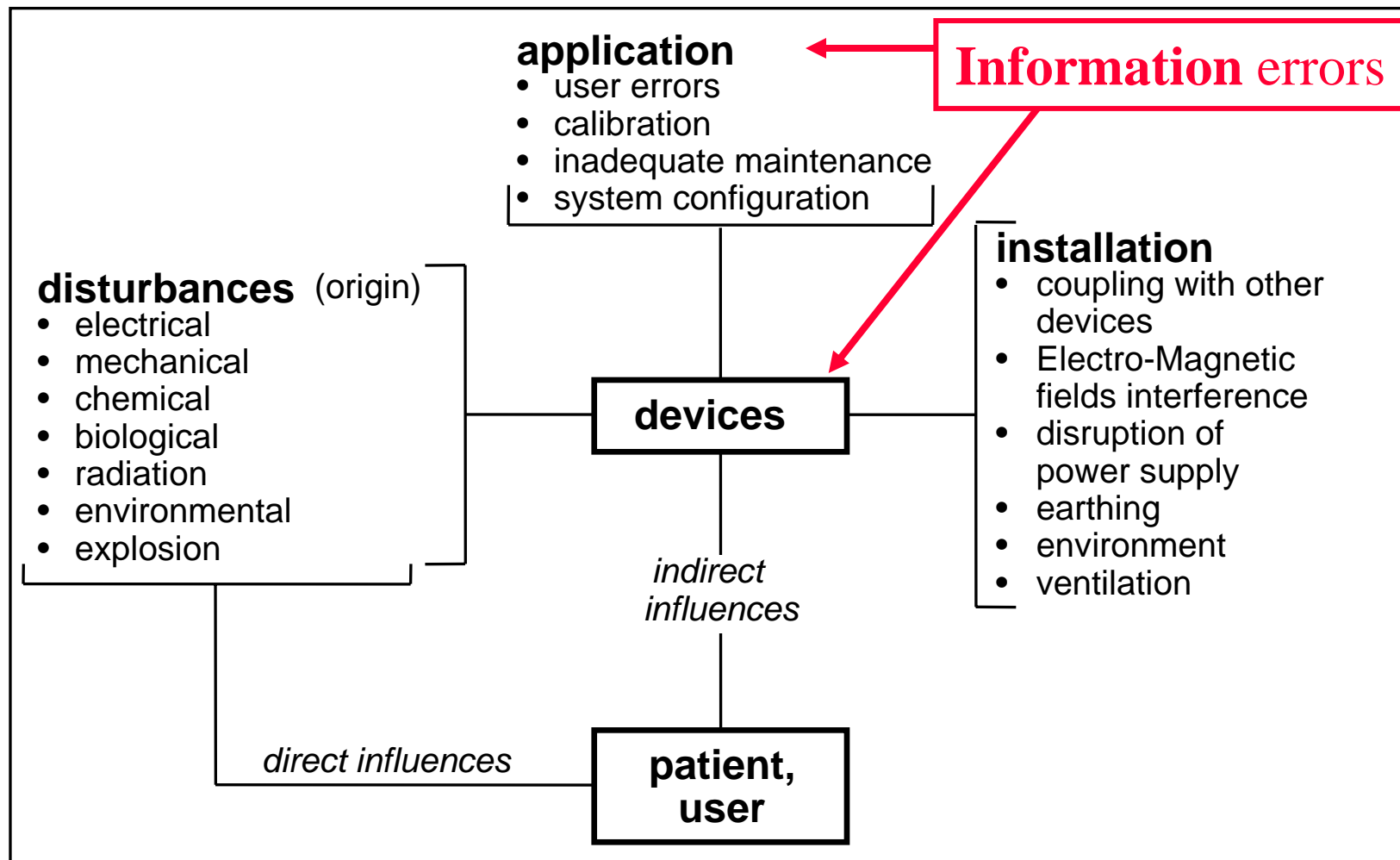
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Holistic view on patient care: MEI-flows model

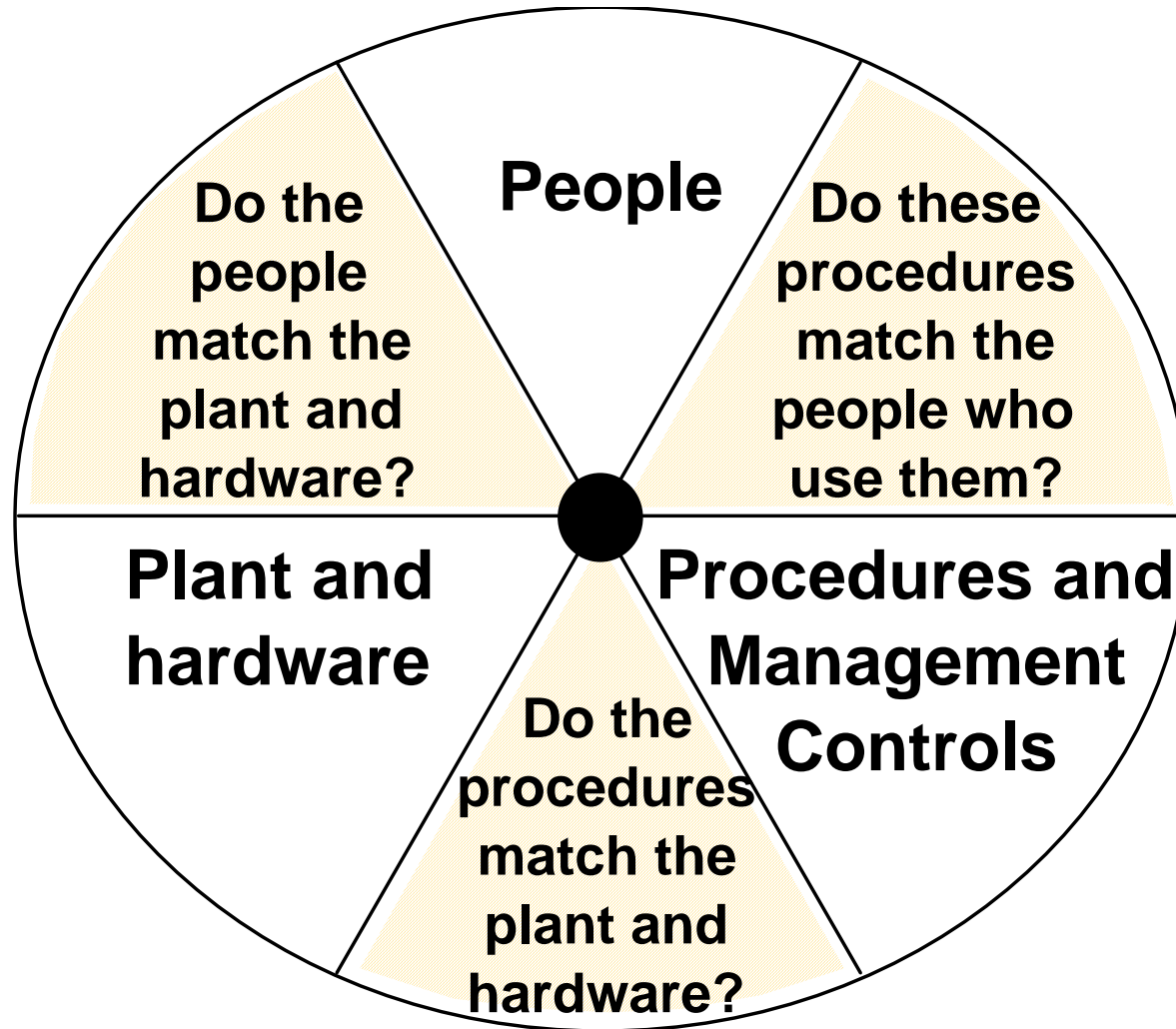


Patient-threatening hazards related to medical devices/systems

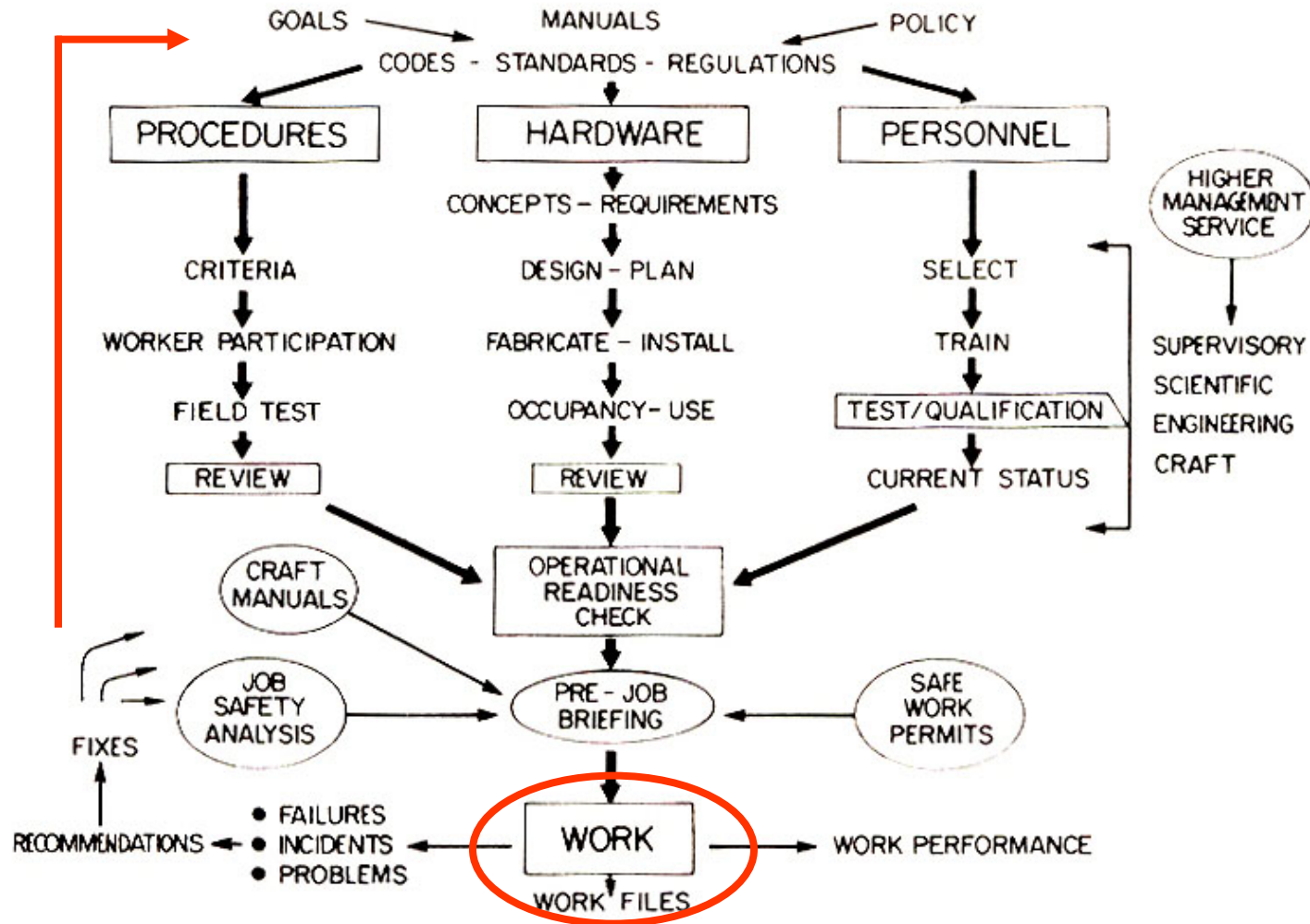


Operational Readiness

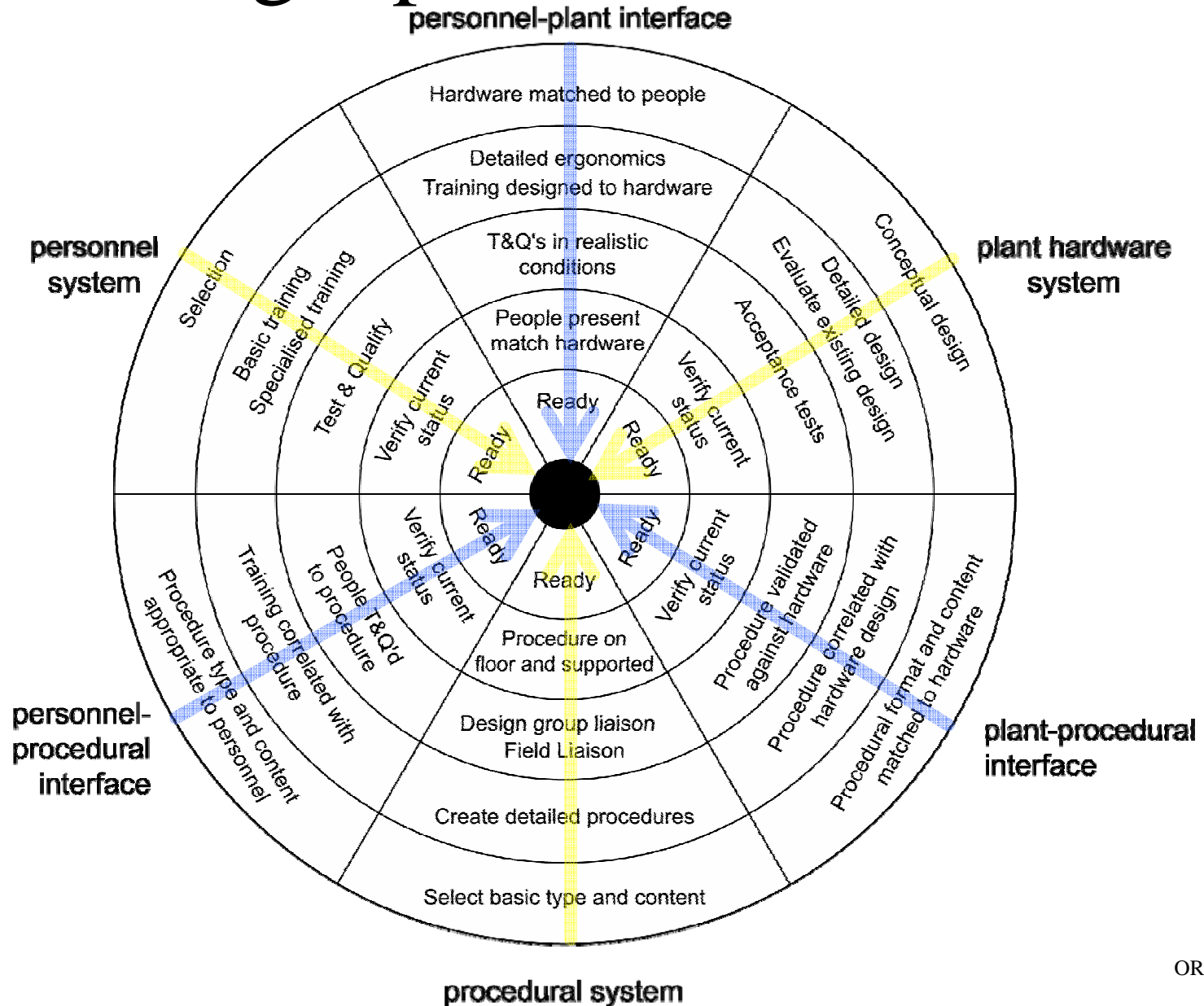
Nertney's Wheel (simplified)



Upstream Processes



Assuring Operational Readiness



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NRI-4 (2007)

ECFA+

Events and Conditional
Factors Analysis Manual

Produced by



The Noordwijk
Risk Initiative
Foundation

NRI-3 (2007)
DRAFT 1.3

3CA

Control Change
Cause Analysis

Investigator's Manual
Second Edition

Produced by



The Noordwijk
Risk Initiative
Foundation

In partnership with

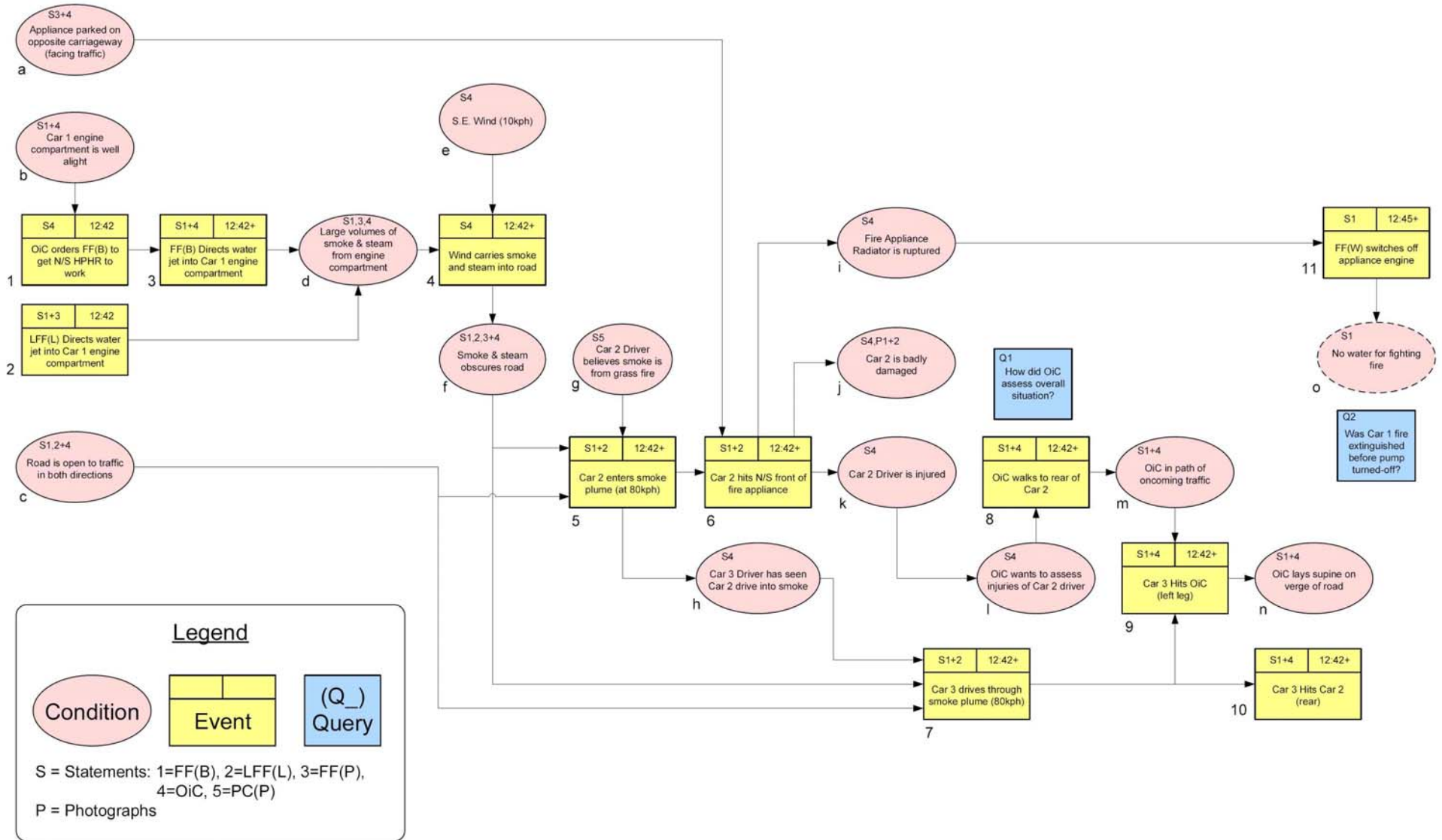
ECFA+ artwork

| | | | |
|---|------------|---------------|-----------|
| Evidence | | Time | |
| S14 | | 1520 | |
| D. Albers | | 9.8.00 | |
| EVENT | | | |
| Albers closes valve "A" | | | |
| <i>Use present tense, one actor/action/object</i> | | | |
| Comments | | | |
| Turns valve until tight | | | |
| ECFA Ref. | E32 | Analyst | JK |
| Format Check | | Logic Check | |

| | | | |
|--|------------|---------------|-----------|
| Evidence | | Time | |
| S14 | | 1520 | |
| D. Albers | | 9.8.00 | |
| CONDITION | | | |
| Valve "A" is overtightened | | | |
| Analyst's basis of judgement | | | |
| SOP 16 requires 8 turns (number of turns to be counted) | | | |
| ECFA Ref. | C38 | Analyst | JK |
| Format Check | | Logic Check | |

| | |
|---|----------------------|
| QUERY | |
| <i>Why did Albers close the valve until tight?</i> | |
| <i>What? Why? Where? How? When? Who?</i> | |
| Query posted at (time & date) | 10:40, 9/8/00 |
| Added to list of further enquiries | Analyst JK |

ECFA+ example



3CA form

| 0 Event | 1 Change | 2 Agent | 3 Effect | 4 Barriers & Controls | 5 Signif | 6 Reasons | 7 Reasons | 8 Reasons |
|------------|-------------|------------|-------------|--------------------------|-------------|--------------|--------------|--------------|
| | | | | | 2 | | | |
| | | | | | 1 | | | |
| | | | | | 3 | | | |
| | | | | | 1 | | | |
| | | | | | 2 | | | |
| | | | | | 1 | | | |
| | | | | | 3 | | | |
| | | | | | 1 | | | |

Where you believe it to be worthwhile, repeat the process for other significant events.

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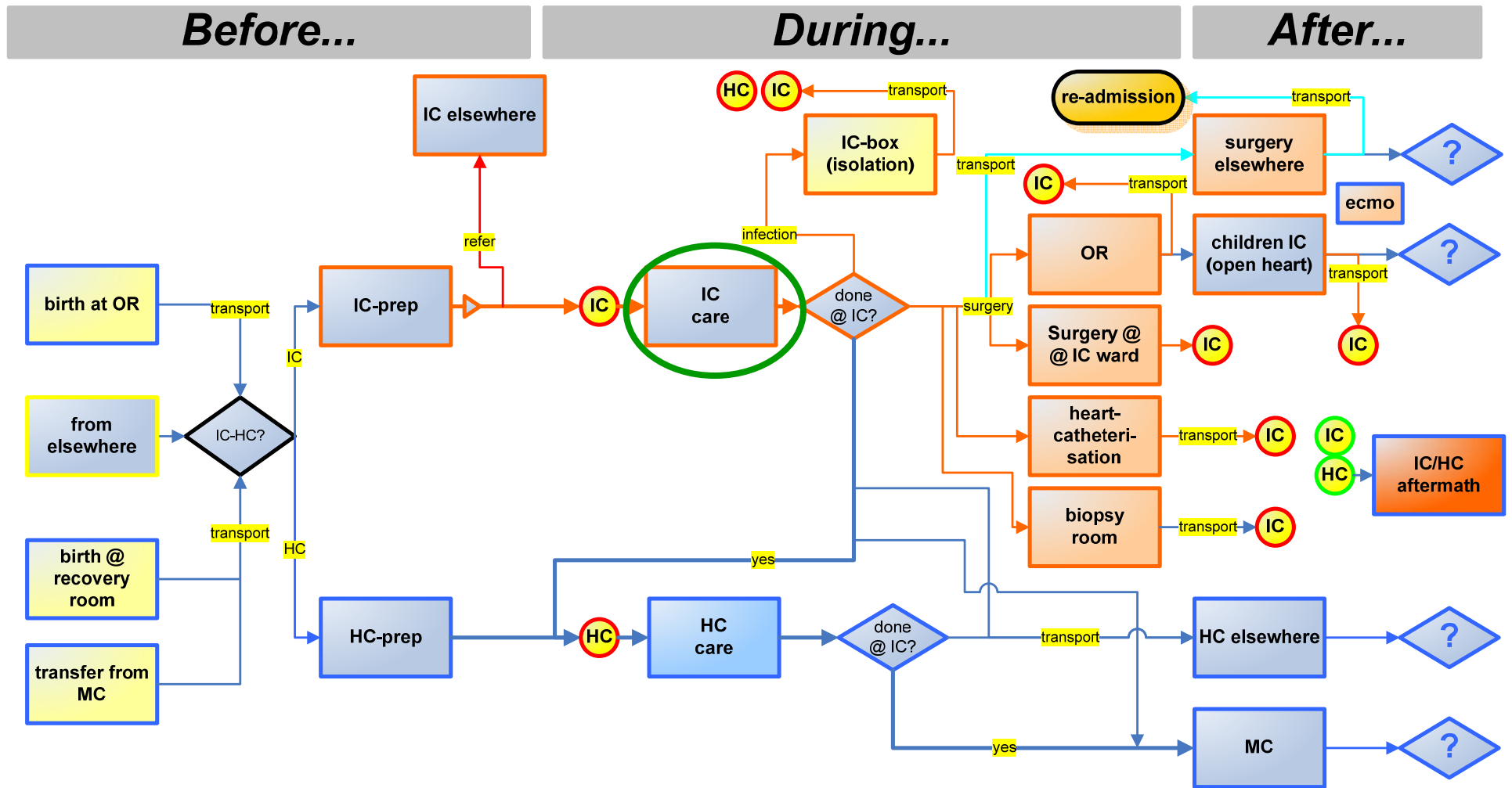
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Keyhole Problem



What are you looking at?

Context handling: business process model



Compensation of Loss-of-Context

- ◆ *in notification data model:*
 - use Business Process Model in notification
 - use known risk scenarios (e.g. $\{S_3 \mid \text{condition } Y\}$)
- ◆ *by learning agency:*
 - members from operational level (sharing 'mental movies')
 - context reconstruction by inquiry

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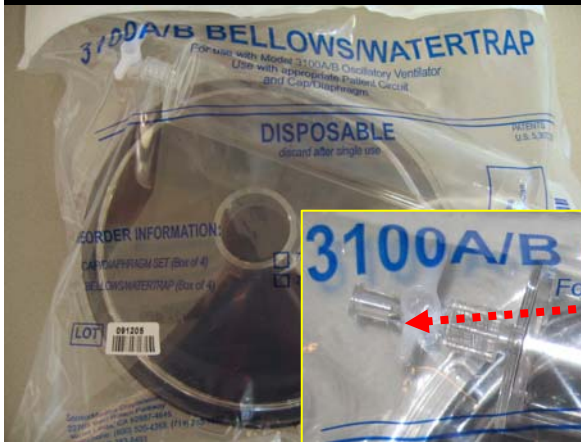
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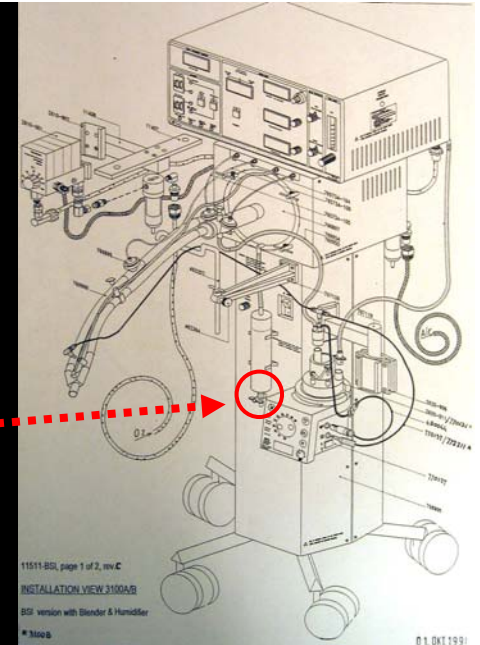
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An example: leakage in HFO-unit

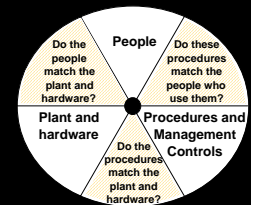


Patient was admitted into the IC neonatology and received HFO-respiration support in the late shift. The night shift noticed at 6:30 h. that the valve of the water trap of the disposable was missing. No alarm had gone off. Around 9:00 h. the leakage was stopped and the proper device settings were restored. The patient did not suffer any harm. Testing showed that loose valve drops out within 15'.



Lessons

- 1. Yellow sticker at the disposable : tighten the valve!**
- 2. Insert in protocol : check all connections of the whole HFO-system**
- 3. Prepare this case as courseware for HFO- en NO-training. Point out in clinical training of nurses that deviating settings indicate leakage**
- 4. Spread the lessons within LUMC and - if needed - nationwide**

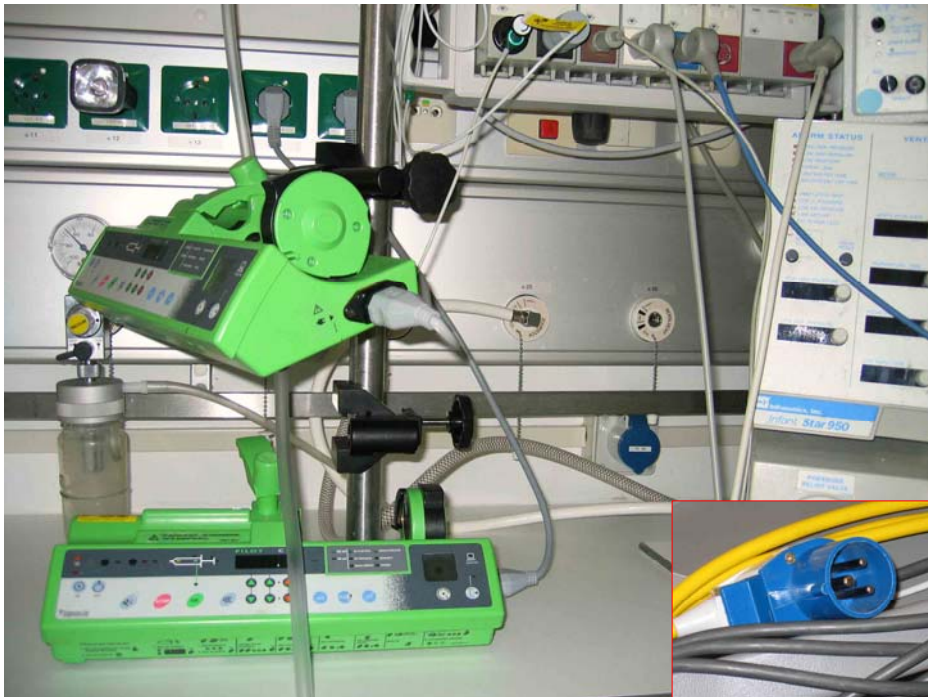
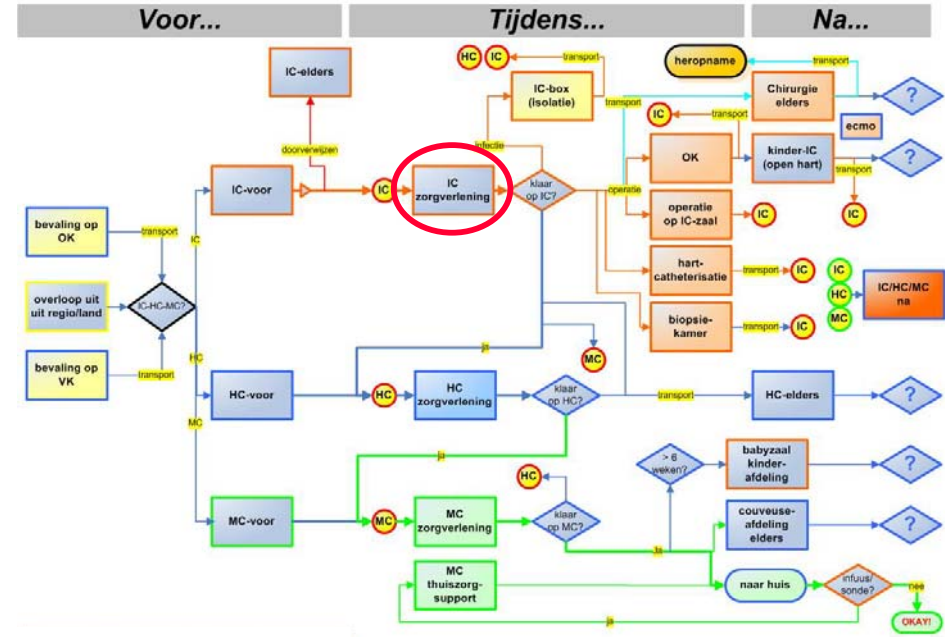


Outcomes of Case Review

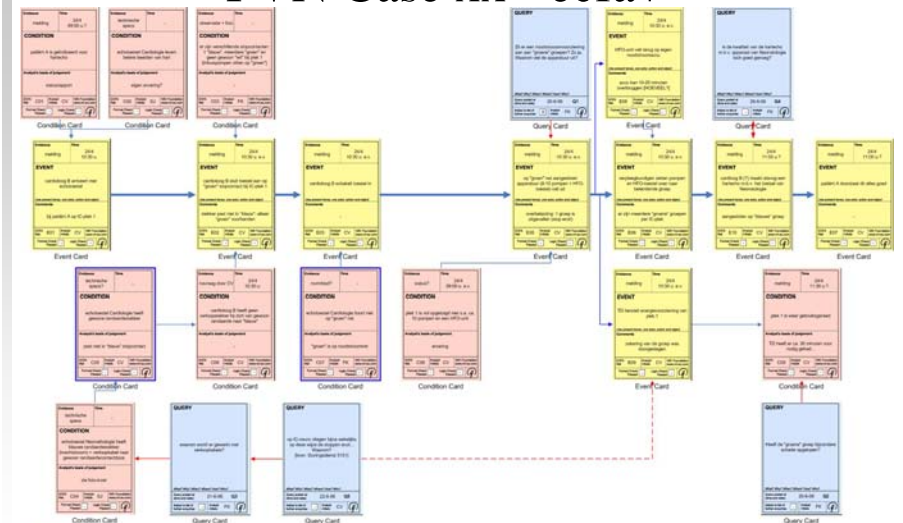
- ◆ Insight in nature of operational problems of quality assurance
- ◆ Identification of external factors
- ◆ Workable lessons ('by nature')
- ◆ Evidence-based dossier
 - Notification form (low threshold)
 - ECFA+ reconstruction
 - Test report (when applicable)
 - **PowerPoint report** including the lessons to be implemented

PVN Case xx

Cardioloog B komt een hartecho maken op neonatologie van patiënt A met het echoapparaat van de cardiologie, omdat deze betere hartbeelden oplevert. Dit toestel heeft een "normale" randaarde stekker, geen verloopstekker voor het verzwaarde 220V-net. Er is wel een verloopstekker geweest maar die is kwijt. De cardioloog sluit het apparaat aan op het "groene" stopcontact en schakelt het in, waarop die groep uitvalt en de hierop aangesloten apparatuur eveneens. De patiënt ligt aan beademing en heeft diverse infuuspompen die onmiddellijk worden overgezet op een andere groep. De HFO viel terug op batterijvoeding. De technische dienst is gekomen om de stroomvoorziening te herstellen. De echo is alsnog gemaakt met het apparaat van de neonatologie.



PVN Case xx - ecfa+

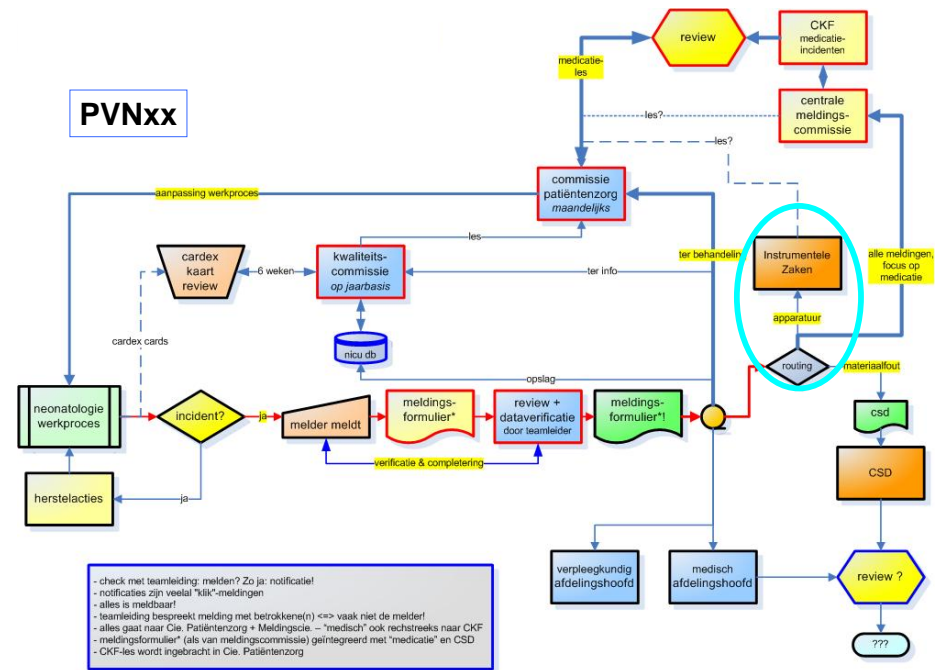


Vragen voor nader onderzoek

| # | Info nodig... | Bron | Ref | Prio |
|----|--|------|--------------------------------|------|
| Q1 | Zit er een noodstroomvoorziening aan aan "groene" groepen? Zo ja, Waarom viel de apparatuur uit? | FK | E05 | |
| Q2 | Heeft de "groene" groep bijzondere schade opgelopen? | FK | C09 | |
| Q3 | waarom wordt er gewerkt met verloopkabels? | FK | C04 > C05 > C06 > E02 | |
| Q4 | is de kwaliteit van de hartecho m.b.v. apparaat van Neonatologie toch goed genoeg? | FK | E10 | |
| Q5 | op IC-neuro vliegen bijna wekelijks op deze wijze de stoppen eruit... Waarom? [bron: TD] | CV | Q3 | |



PVNxx



- check met teamleiding: melden? Zo ja: notificationel
 - notificaties zijn veelal "klik"-meldingen
 - alles is meetbaar!
 - teamleiding bespreekt melding met betrokkene(n) <=> vaak niet de melder!
 - alles gaat naar Cie. Patiëntenzorg + Meldingscie. - "medisch" ook rechtstreeks naar CKF - meldingsformulier (als van meldingscommissie) geïntegreerd met "medicatie" en CSD
 - CKF-les wordt ingebracht in Cie. Patiëntenzorg

Vragen voor nader onderzoek

| # | Info nodig...: | Bevindingen |
|----|--|---|
| Q1 | Zit er een noodstroomvoorziening aan aan "groene" groepen? Zo ja, Waarom viel de apparatuur uit? | Ja, binnen 15' komt spanning terug na externe stroomuitval. N.v.t. Zekering viel uit! |
| Q2 | Heeft de "groene" groep bijzondere schade opgelopen? | Nee. Als zekering weer IN, dan alle apparatuur opnieuw instellen |
| Q3 | waarom wordt er gewerkt met verloopkabels? | Apparaatgebruik onder verschillende installatievoorzieningen |
| Q4 | is de kwaliteit van de hartecho m.b.v. apparaat van Neonatologie toch goed genoeg? | Ten dele smaakkwestie plus apparaat Cardio is nieuwer |
| Q5 | op IC-neuro vliegen bijna wekelijks op deze wijze de stoppen eruit... Waarom? [bron: 5151: storingsdienst] | Vraag wordt doorgeleid naar CMC |



Review – lessen PVN Case xx

Opties:

- 1) verloopsnoer leggen op apparaat van Cardiologie
- 2) actie naar Cardiologie: gebruik verloopsnoer op Neon!
- 3) FW (hoofd Neon) vraagt bij hoofd FD waarom apparaat niet met blauw snoer wordt geleverd
- 4) Vraag Q5 voorleggen aan CMC (Centrale Materialen Commissie)
- 5) Plaats ook hoger belastbare witte stopcontacten op de ICs

Keuze: 1 + 2 + 3 + 4 + 5

Principles in Patient Safety OL Pilot

- ◆ project is owned by each unit+LUMC
 - TU Delft supports (methodologically)
- ◆ mobilise expertise members Learning Agency
 - Support by own learning agents is crucial
- ◆ builds much as possible on current practice
- ◆ 'evidence-based' case-review in order to learn regarding assurance of own work processes
- ◆ "Organisational Learning" by units within LUMC
 - a lesson is learned only by implementing it!

Biomedical Engineering courses

(as part of BME minor)

Lecture (2 hours) in Medical Technology course

- ◆ includes brief intro in standards and regulation

Practical (2 ECTS)

- ◆ Failure Mode and Effect Analysis
- ◆ Fault Tree Analysis
- ◆ Quality Assurance Metrics [T. Gilbs]

trained at skill level...

- ◆ applied to medical system

Clinical Physicists (post-graduate) module

5 thematic afternoons + exam thesis, incl.

- ◆ General Framework for RA and RM
- ◆ Risk Analysis methods, incl. FTA, FMEA
- ◆ Organisational Learning from Incidents
- ◆ Work processes and design of MeD
- ◆ Regulation and standardisation - user perspectives; safety case approach