

Procedures – As imagined or As done?

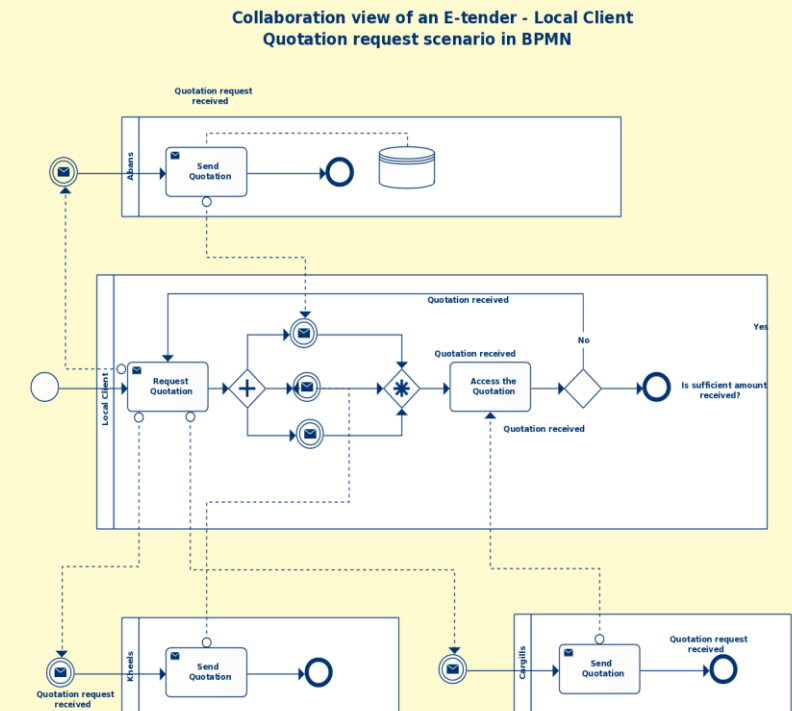
How to Brush Your Teeth	
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FRAMily 2018



The Problem

If you're a big organisation, you are expected / required to have / show

- An ISO 1400 “Quality” accreditation
- “Governance” Monitoring, Auditing and Reporting documentation
- “Enterprise wide” Risk Management (ISAO 31000) Reports
- A “Safety Management System” (SMS)
- A Business Continuity and Contingency Plan!

Essential for running a “safe” operation, or

Time consuming, Expensive, Productivity reducing bureaucracy?

No choice? – comply or consider the consequences? –

No point in asking about conflicts, cost effectiveness, competences, etc.?

Because you've got to have it! Essentially inescapable “Licence to Operate”?

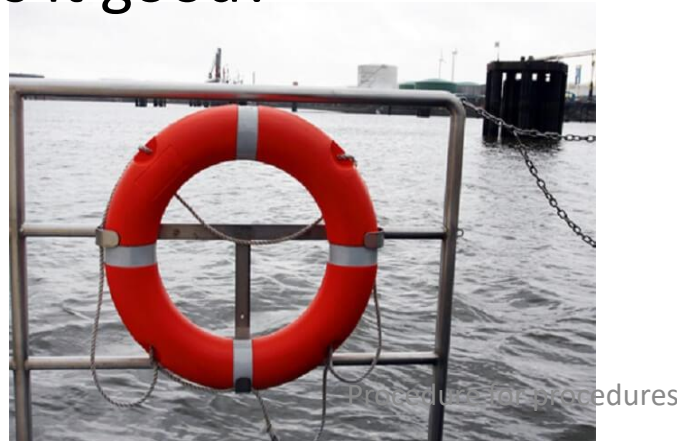
The Result

- **Standardised (ISO) Standard services**, formats, templates, turn key contracts
- **Specialist consultants, proprietary solutions, implied guarantees** (we know the auditors / inspectors very well – we'll see you pass OK)
- Do we have / can we spare our people and time to learn the “Tricks of the Trade”? (Value for money?)
- So external, specialist “scribes” produce the required documentation from previous successful models, checklists, generalised outlines, etc.
- OK for filling in expense forms, but when really needed? (Permit to work – Piper Alpha)
- **Have to plough through the ring binders** or rummage about in the company clouds (its there would be the legal defence)
- But inevitably (Hudson River) “Too little, Too late” and often totally inadequate, corporate speak.

Example from ISM Code (SMS)

This is Bridge Checklist – What's it For?

- I hereby acknowledge (I have ticked all the right boxes?)
- I have an Echo Sounder (does it work?)
- Accountability and Compliance? (You signed it as OK!)
- Every Box has same rating?
- Risk Assessment carried out – so what did it show?
- What are the variabilities you have accepted?
- Tool box talk done – was it good?



Complete all sections with a ✓ or N/A

Bridge Checklist

ISM Safety Management System

Navigation			
Charts and TECDIS route, waypoints, and check for dangers		Weather and Tide weather forecast and tide table checked	
Instruments			
Radars (2)		Navigation lights (main/backup)	
AIS updated		GPS	
Compass (Main/GPS)		Binoculars	
NAVTEX	✗	Window wipers	
Echo sounder	✗	Whistle/fog signals	
Log		Fire alarm and control panel	
Communication equipment			
MF/VHF DSC/Radio		PA system	
SAR finder		Portable VHF radios	
Risk Assessment & Toolbox talk			
Risk assessment carried out	✗	Toolbox talk done	✗
Manoeuvring			
Engine	STB	PORT	Steering
Main engines			Autopilot
Aux engines/generators			Centre joystick in zero
Lift fan engines			Starboard joystick in zero
Main alarm/control system			Water jets/clutch
Lift fan panel			SES system/panel
Communications			
Port notified		Marine coordinator notified	
Passengers		Other	
PAX boarding completed		CCTV cameras	
Check PAX passport			
PA call to PAX		Landing light on foredeck	
Safety video for PAX		'Be seated' light in PAX lounge	
Departure: Date and time: _____ Checked by: _____			
Arrival: I hereby Acknowledge that Status is unchanged since departure:			
Date & time: _____ Checked/confirmed by: _____			

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Got to be a better way?

- These “manuals” are classic SAFETY I documents
- Top down, As Imagined, What the management need, What the auditors need to assure control of “Failures”!
- We need a SAFETY II approach – focussed on what’s actually needed to do it “successfully”.
- A single joined up approach (do we need all this ring binder bureaucracy?), that is acceptable to the auditors / regulators, but
- That works and produces a living, useful record, supported by meaningful “models” that are produced by the sharp end, for the sharp end that allow continuous improvement not continuous excuses.

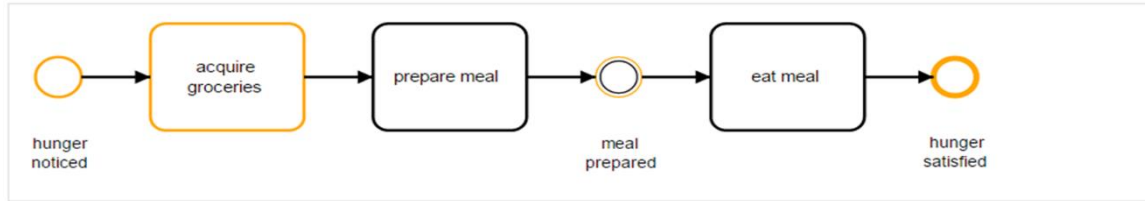
How? – System thinking

- First we need to understand exactly what's going on, what's needed?
- Needs to involve the people doing the job – a temporary, lone external consultant, (no matter how highly paid) just doesn't cut it!
- And a consensus, updatable “Model” of the system / organisation; and how the different processes and the procedures necessary to make them happen are all interconnected, interactive and interdependent.
- A “Model” that lays out the “steps” involved, such that the progress of the process “emerges” and is not based on / constrained by predetermined ideas of how it ought to work and allows for real life variabilities in the conditions that the teams encounter as normal challenges

Yes we're talking about FRAM, but

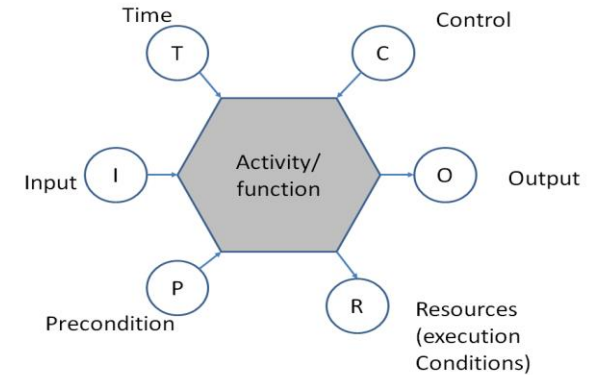
- Although there are many examples of how successful FRAM has been in healthcare procedures, it seems to be **too problem specific, informal and unstructured for the majority of consultants and organisations to adopt.**
- Or “better the devil you know”?
- Formal Business Process Modelling, (BPM), though acceptable, **fails the interactive / emergence criteria** for our system model
- What we are suggesting for a current client is to **use the best features of each**, BPM for sketching out the process and the steps needed (aimed for) and FRAM to enable the Team to consider formally all the interactions and variabilities, likely to be encountered in real applications.
- Lastly to ensure the process needs to produce a product as a **living, documented, continuously improving “Procedure”** – that can fulfil the spirit and objectives of the “Standards” without the lucrative but wasteful plethora of paperwork currently imposed, but rarely used in anger.

Either , Or; or Best of Both?



BPM

- Currently acceptable as “Normal”
- Linear, predetermined
- Normal Process “As Imagined”
- Focussed on individual “Tasks” in strict (Time) sequence
- Background “Actors” also treated in isolation, sequentially
- Linked (Choreographed) in timings – but
- No concept of whole “System” interdependence, instantaneously
- Written for “workers” by “experts”

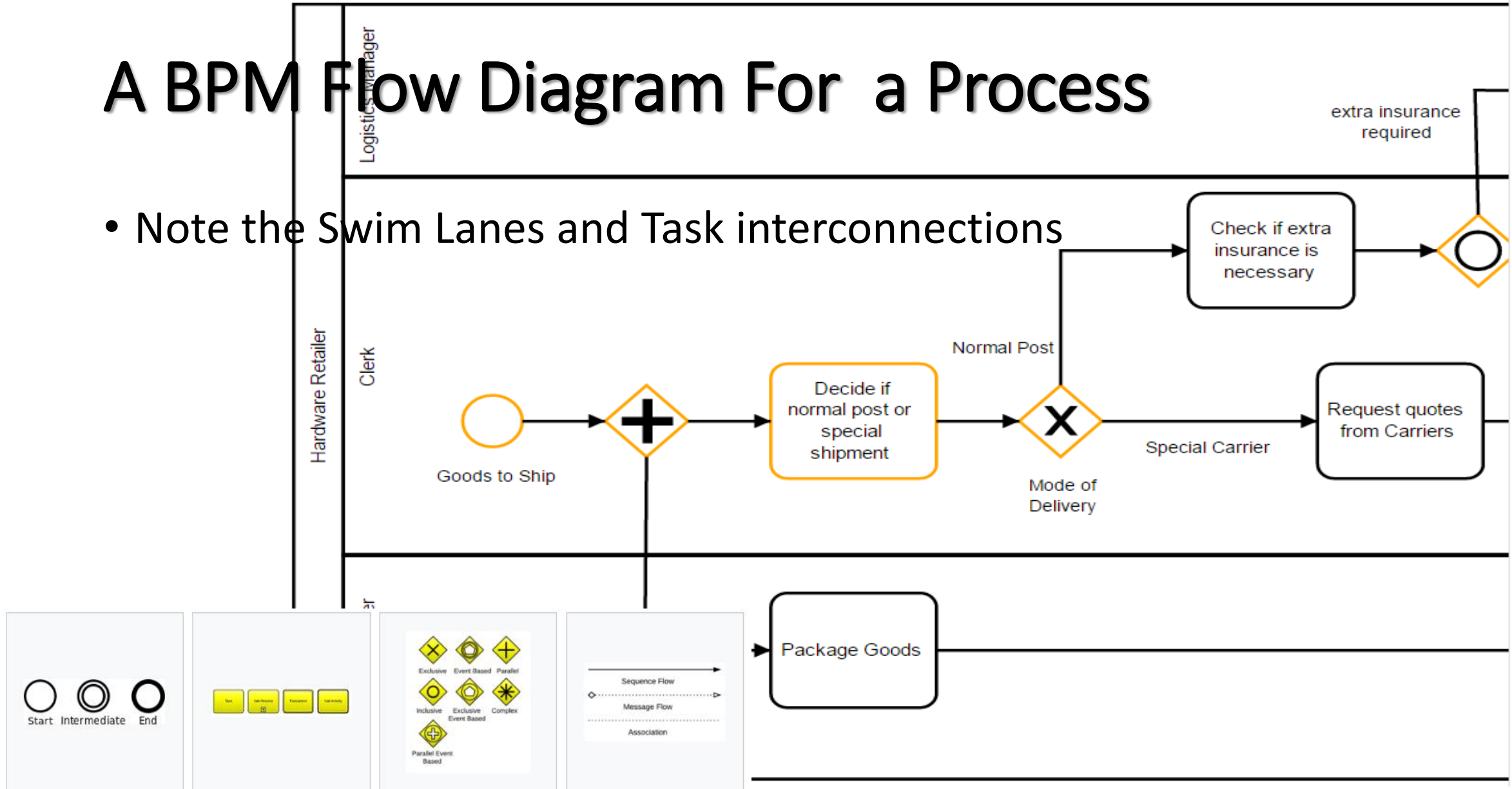


FRAM

- “New” (MORE?) resource intensive
- Non linear, emergent
- Normal Deviations (Variabilities) considered formally “As Is”
- Includes all Functions contributing to successful outputs
- Simultaneous variability in Background Functions also considered closely
- Time considered in the context of that instant (Too little, Too late).
- Whole system palette
- Best done by “workers” recorded by “experts”

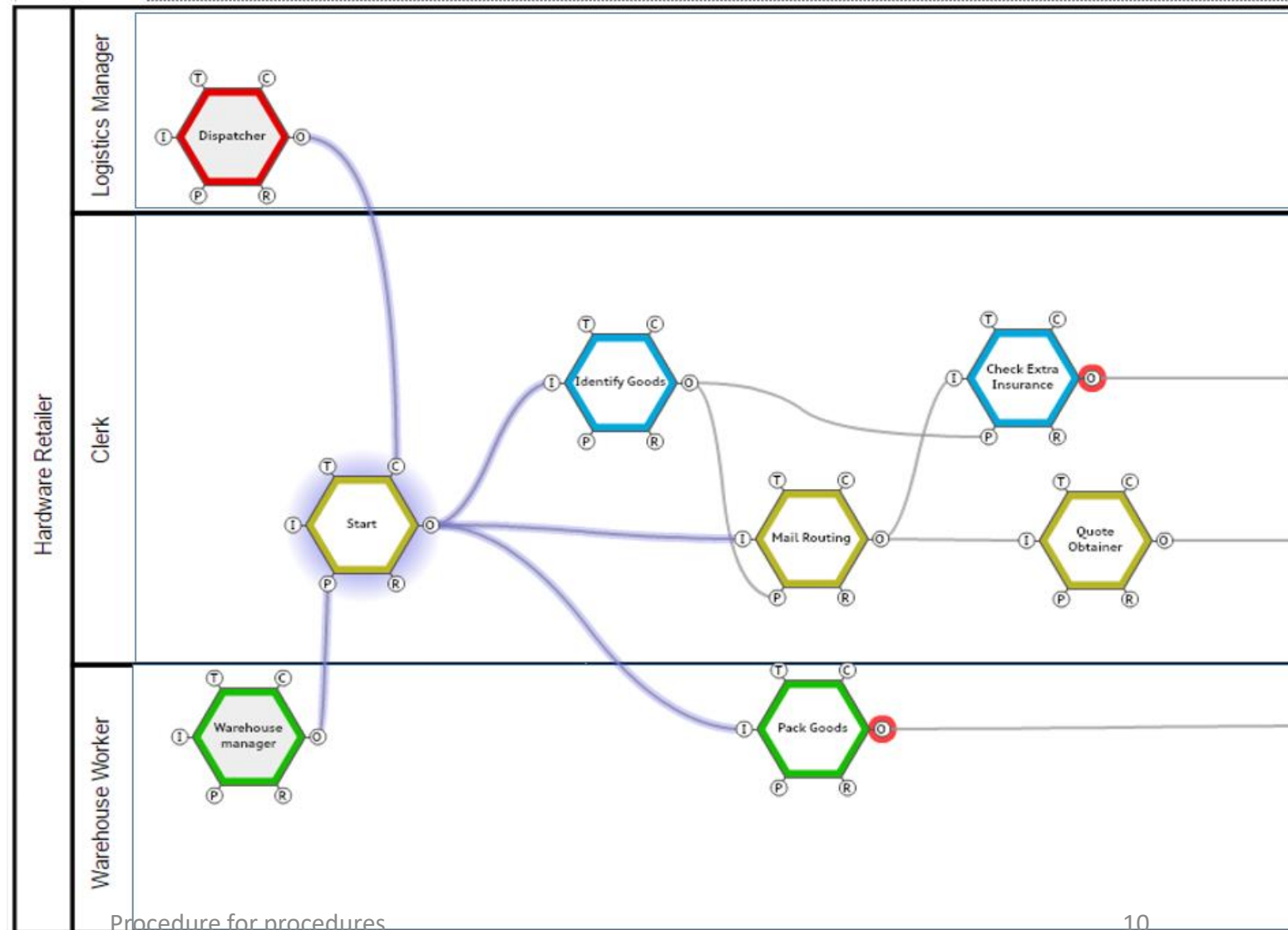
A BPM Flow Diagram For a Process

- Note the Swim Lanes and Task interconnections



The Same FRAM sequenced Functions

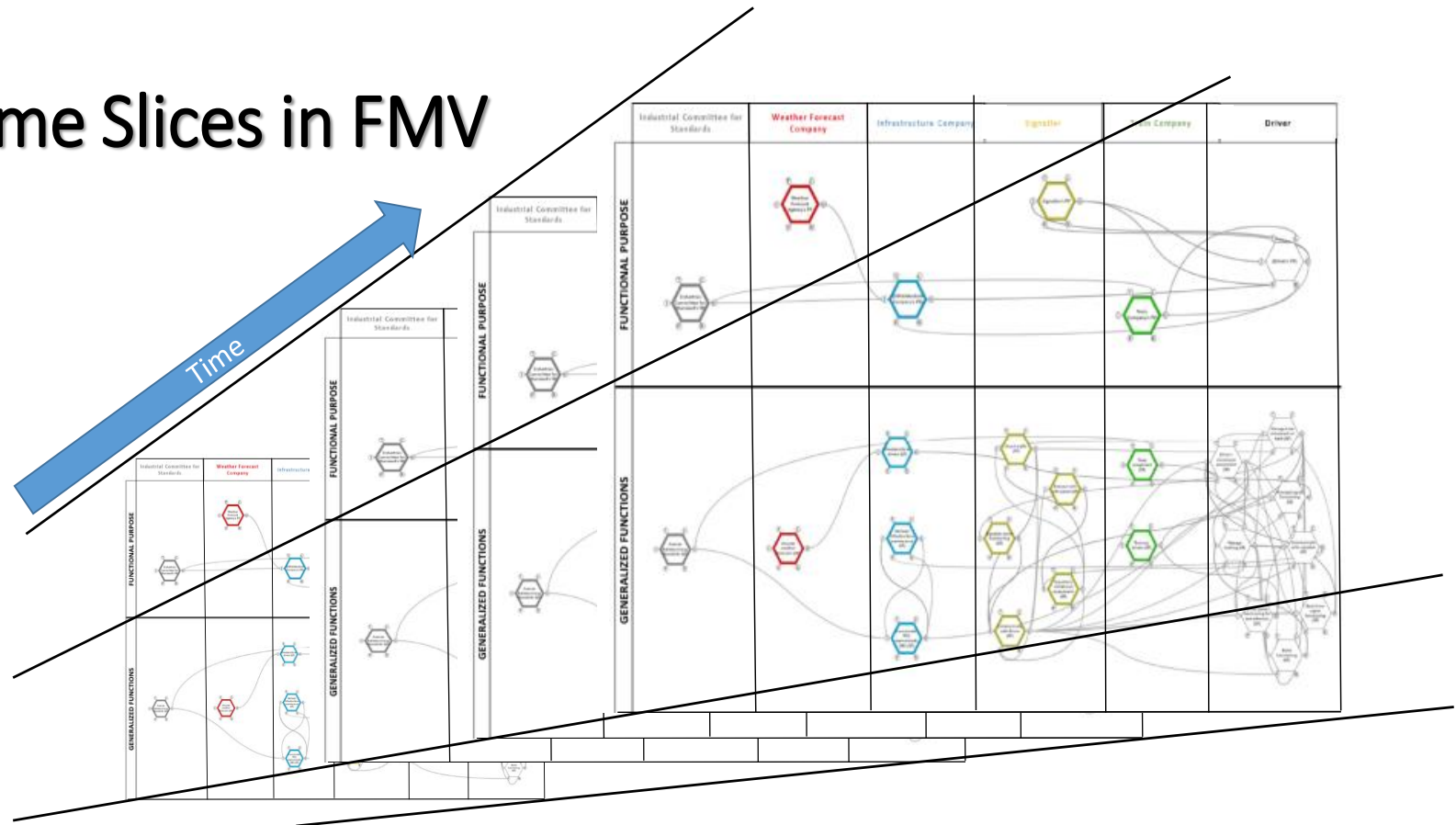
- But FRAM works in “Instantiations” and the succeeding states of the functions are strictly (Markovian) determined only by the values in the preceding step.
- They “emerge” for the next time step.
- The FRAM plane is thus orthogonal to the BPM plane



The FRAM instantiations of the BPM steps are thus a series of emerging “time slices”

- Status of functions in the next instantiation are set by their final status in the previous instantiation –
- EXCEPT when it is a time or sequence dependent status
- So we need to include this time dimension formally

Time Slices in FMV



Hierarchy Z Axis – Level or Detail

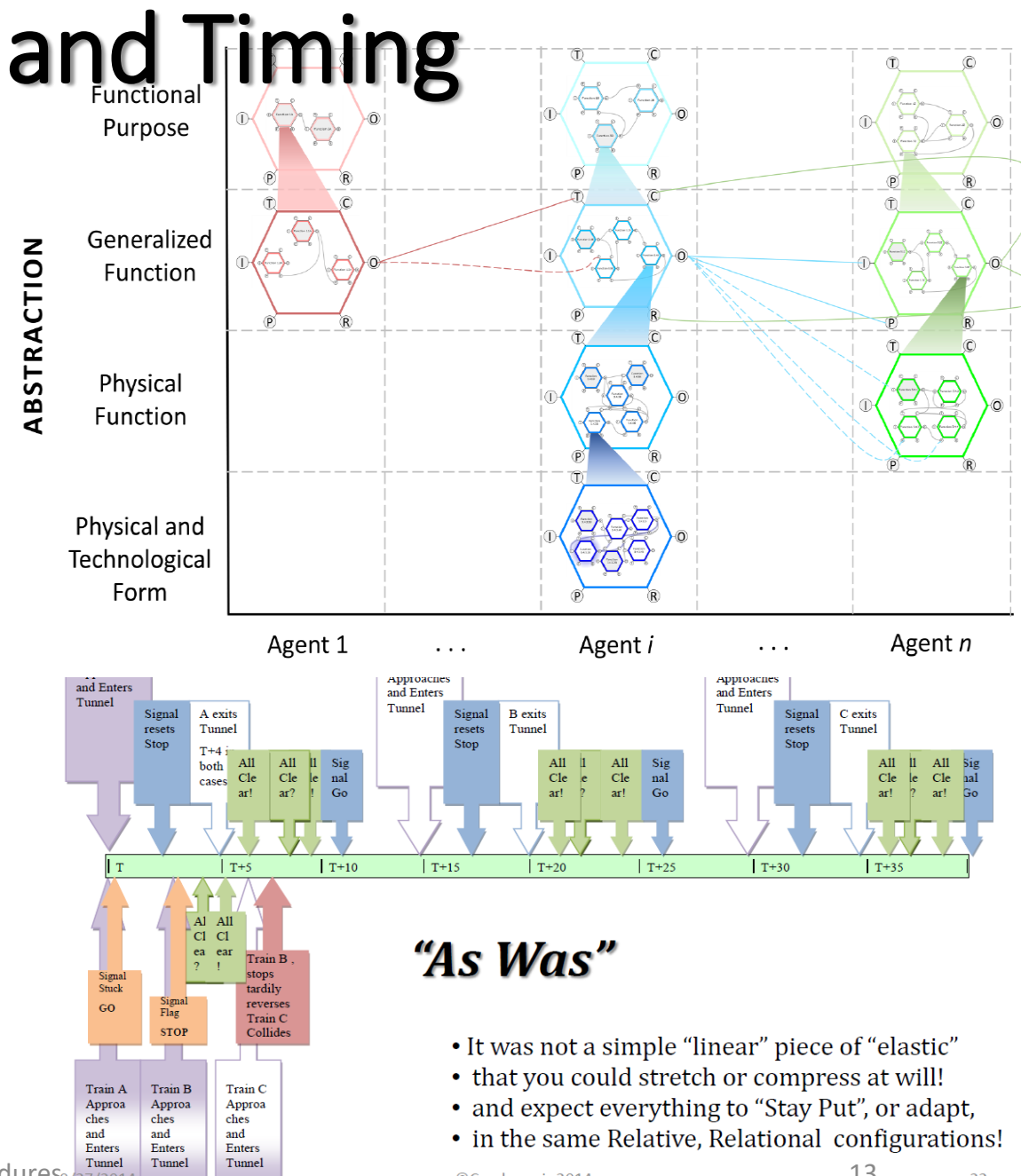
BPM X Axis –Timeline sequence

FRAMBPM gives us the option of 3 Dimensional Flow Charts.

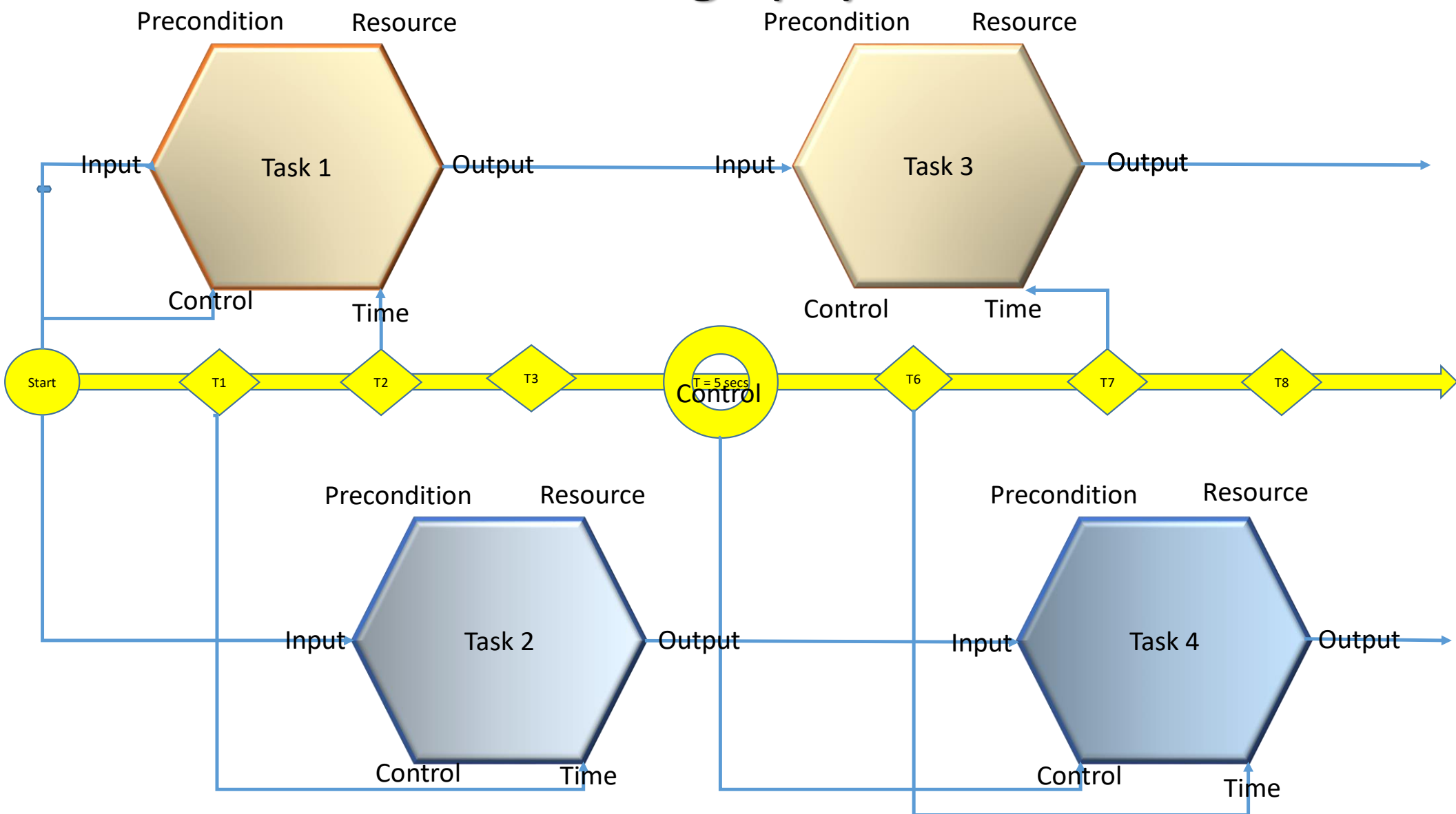
FRAM Y Axis – Instant Interdependencies of Functions

Interdependencies of control and Timing

- BPM uses two terms we might consider adopting for our enhanced FRAM
- ORCHESTRATION
- Groups sets of Agents (Actors) and tasks in connecting “Pools” and “Hierarchies” accommodates Patriarca's Abstraction Hierarchies ideas
- CHOREOGRAPHY
- Uses connections between tasks to indicate in which order Events and Tasks need to happen.
- A better way might be to incorporate a Timeline as illustrated for the Clayton Tunnel FRAM Analysis

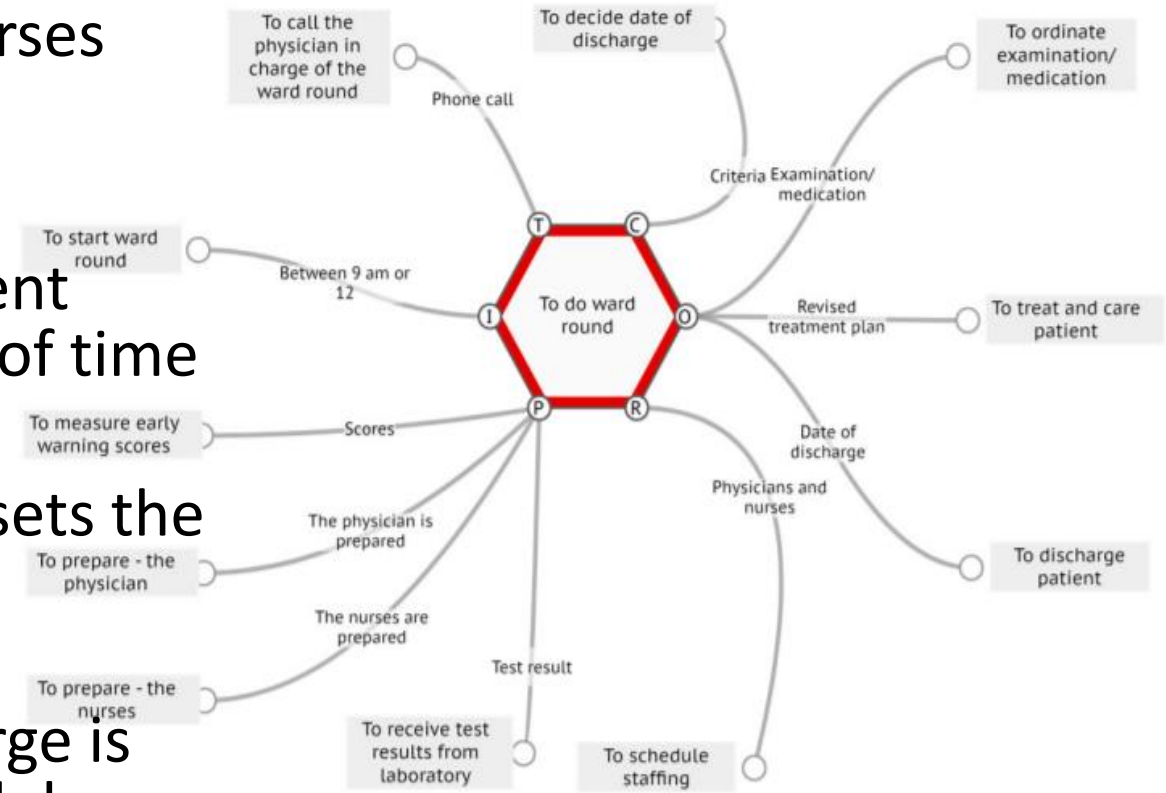


Using BPM to “Time” the Choreography of the FRAM Functions



Timing is everything - Coordination or Chaos?

- From classic FRAM studies (Hounsgaard), a ward round starts when the physician and the nurses are prepared and have found each other.
 - Normally this is between 9 am and 12.
 - When the ward round starts at 12, the patient cannot be discharged same day due to lack of time to carry out the discharge function.
 - The physician in charge of the ward round sets the date of discharge in cooperation with the nurses.(As Imagined?)
 - During the ward round the physician in charge is often interrupted by phone calls. This also delays the finish of the ward round. (natural variabilities)
 - Each physician thus has his/her own way of setting the date; some do not set a date at all and the patient is discharged when ready. (As Is?)
-
- Jeanette Hounsgaard CENTER FOR KVALITET



“As Imagined”

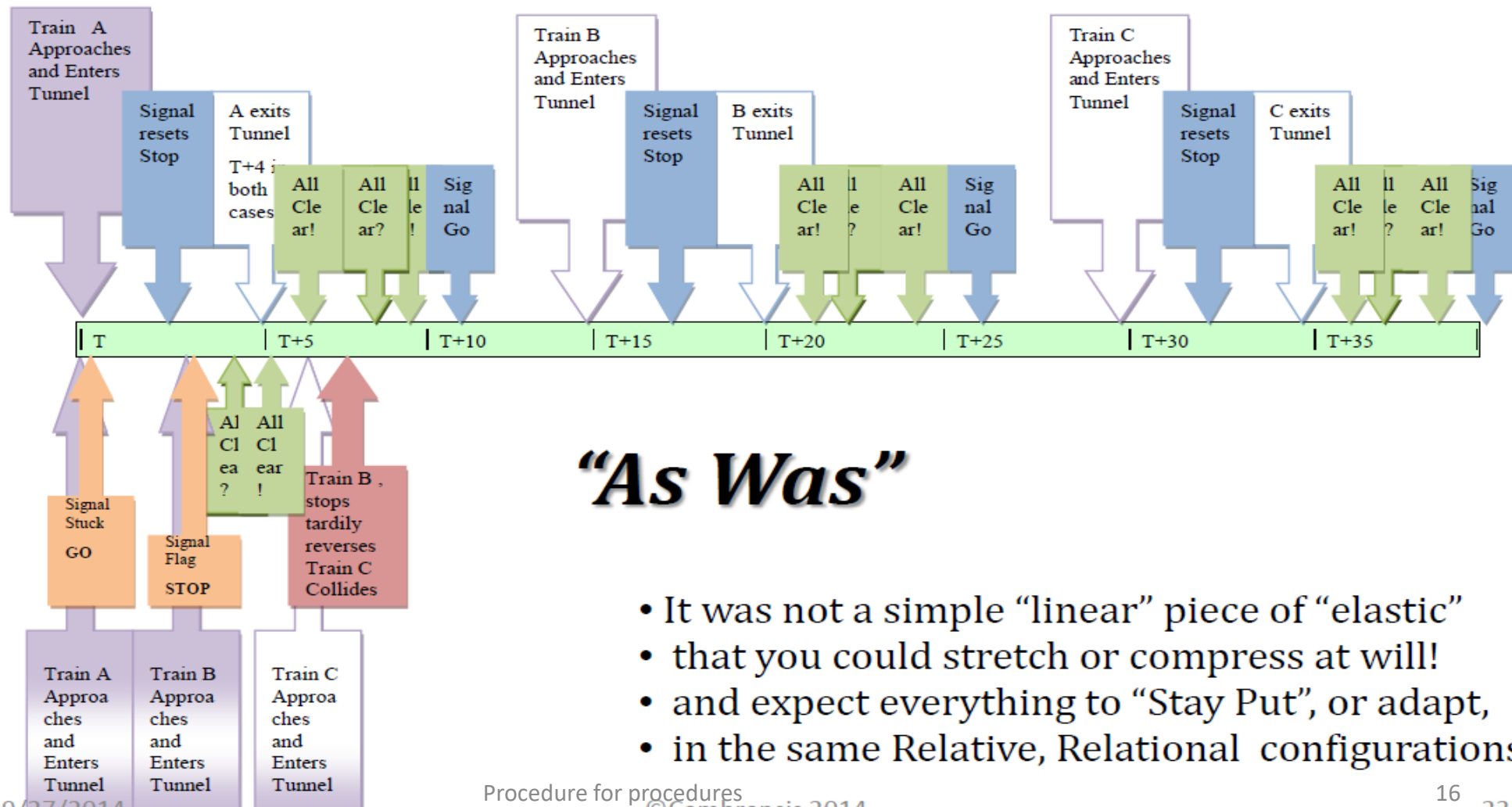
Timing is not flexible!

Incident Timeline

Clayton Tunnel Entrance control System

- An orderly “sequence” of actions, with “fail safe” handovers?

- Procedure by the Book
- Time
- Procedure as operated



“As Was”

- It was not a simple “linear” piece of “elastic”
- that you could stretch or compress at will!
- and expect everything to “Stay Put”, or adapt,
- in the same Relative, Relational configurations!

Implementation – The Preparation

- Identify critical procedures (which warrant in depth study)
- Use classic FRAM preparation for a specific procedure (one at a time)
- Research, Interviews, people, functions, current issues, goals, criteria as normal.
- Produce outline draft flow diagram (BPM) of the procedure as currently imagined, or described – noting conflicting interpretations, needs and objectives.
- Sketch out FRAM Model (one I prepared earlier) of how functions interact in different instantiations or steps

Implementation – The Team Study

- Assemble, insulate, isolate / focus a study team, - Facilitator / Secretary / 4 – 6 (say 2 designers/ experts, 2 Operators)
- To work on a BPM Flow chart to identify and set out the desired sequence of tasks steps and intended sequencing needed to operate that particular process.
- For each step, to assemble explore a FRAM instantiation to check that all the necessary Aspects are available and sufficient to enable the required output of the function driving that step. Also to use the emerging properties of the Aspects after this step are the starting set for the next step (which may or may not be as expected / intended).
- To note issues thrown up and consensus solutions / recommendations identified and write up as a revised consensus “Procedure”



Marine Example – Vessel Departure Procedure - FRAM Functions and Steps (instantiations)

We considered a Hierarchy of 3 levels of (detail for) the functions required

- **Level 1** – background and Time Step Functions say -
 - Check Cargo, Prepare ship, Clear for departure, Start departure, Complete Departure.
- **Level 2** – The detailed functions required to achieve Level 1 outputs successfully
 - Check manifest, check lashings, single up fore, single up aft, etc.
- **Level 3** – the detailed functions needed to complete (Level 2) “single up fore”.

Level 1 Departure Activities and Timeline - 1

Ship has / is given an Estimated Time of Departure – ETD say 1600

(INPUT 1) From Background Port Scheduling Function – Say 1500 hours, as roughly when the cargo operations would begin

Step 1 - At 1500 – (Instantiation 1 - Cargo, ship readiness. checking)

Step 2 - Then Say 1515 – (Instantiation 2 – Prepare for Departure)

Step 3 - Then Say 1530 – (Instantiation 3 – Ensure Ship is ready to Depart)

- Pilot boards around 1530

Step 4 - Then say 1545 – (Instantiation 4. – Man departure stations)

- Captain on the Bridge Engines on standby
- Tugs ready for making fast

Level 1 Departure Activities and Timeline - 2

Step 5 - Then say 1550 – (Instantiation 5 - Captain starts departure process)

- Single up forward - O2, R2 comply Single up Aft – O3, R3 comply
- Rig Pilot Ladder – O2 or O3 R1 & R2 comply

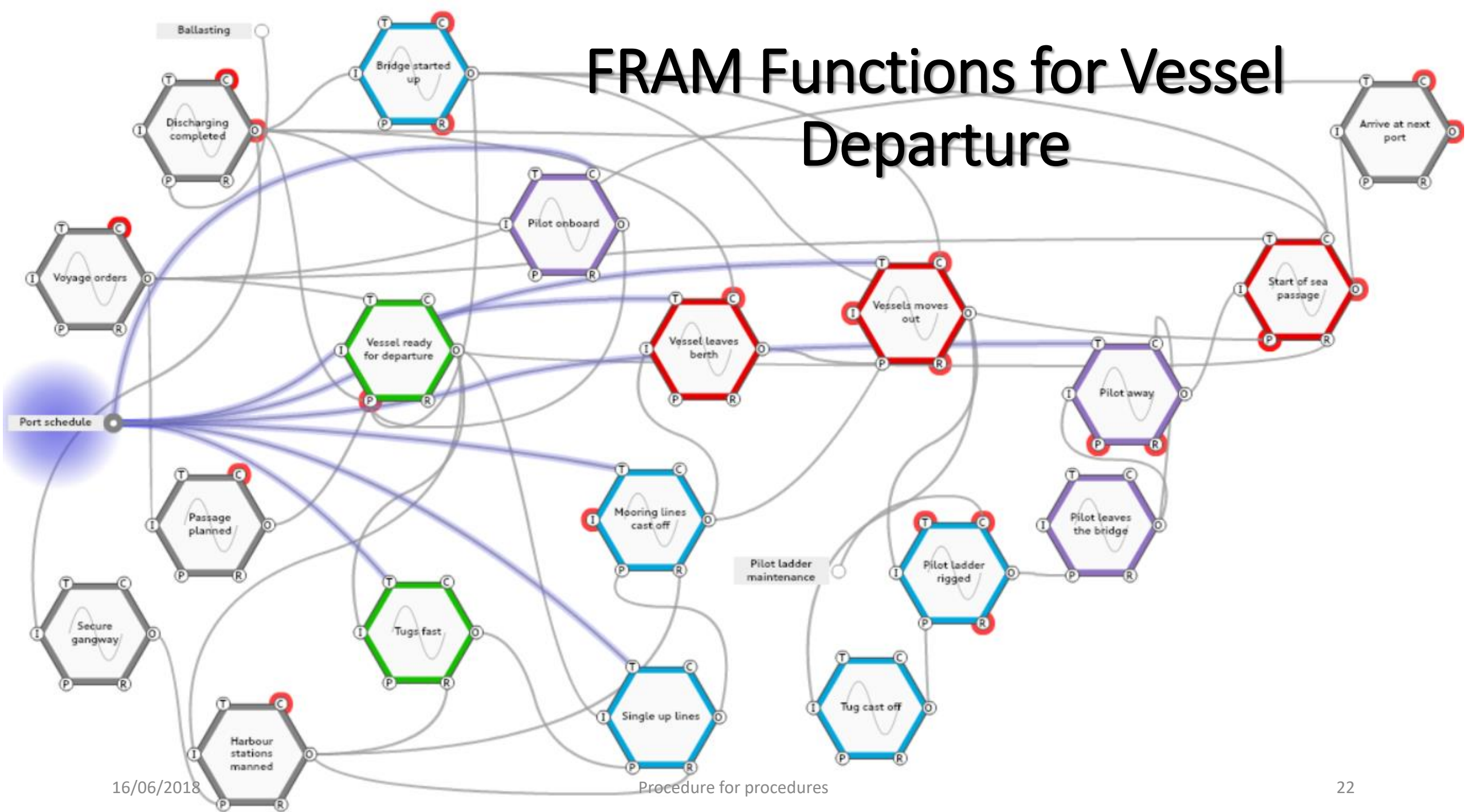
Step 6 - Then say 1600 (ETD) – (Instantiation 6 – complete Departure process)

- Release and pick up mooring lines
- Move out into Harbour – set course to depart
- Release Tug lines
- Disembark Pilot
- Clear Harbour breakwater.

Step 7 - Departure Process successfully completed.

Step 8 - Next Arrival Process?

FRAM Functions for Vessel Departure



Prior to arrival at pilot station (with the duty officer, lookout, helmsman and master on the bridge)	Pilot on-board for berthing (with bridge team and pilot)	Vessel alongside
To Master Main engines functional ➤ Main engine 1 tested ○ Ahead and astern <input type="checkbox"/> ➤ Main engine 2 tested ○ Ahead and astern <input type="checkbox"/> Thrusters functional ➤ Bow thruster <input type="checkbox"/> ➤ Stern thruster <input type="checkbox"/> Pilot station contacted ➤ ETA confirmed <input type="checkbox"/> ➤ Pilot boarding time confirmed <input type="checkbox"/> ➤ Pilot boarding arrangements rigged and tested <input type="checkbox"/> To Duty officer Duty engineer informed <input type="checkbox"/> Engine room readiness verified with duty engineer <input type="checkbox"/> Engine room readiness reported to master <input type="checkbox"/> Navigation equipment functional <input type="checkbox"/> ➤ Communication systems <input type="checkbox"/> ➤ Radar 1 <input type="checkbox"/> ➤ Radar 2 <input type="checkbox"/> ➤ ECDIS <input type="checkbox"/> ➤ Gyro <input type="checkbox"/> ➤ Auto-pilot <input type="checkbox"/> ➤ Steering system <input type="checkbox"/> ➤ Emergency steering <input type="checkbox"/> ➤ Navigation lights <input type="checkbox"/> ➤ Echo Sounder <input type="checkbox"/> Both anchor lashings removed <input type="checkbox"/> Bridge team confirmed ready for arrival port <input type="checkbox"/>	To Master Master-pilot exchange completed <input type="checkbox"/> ➤ Berthing plan confirmed <input type="checkbox"/> ➤ Tidal information confirmed <input type="checkbox"/> ➤ Mooring arrangements confirmed <input type="checkbox"/> ➤ Tugs arrangements confirmed <input type="checkbox"/> ➤ Contingency plans discussed <input type="checkbox"/> To Duty officer Harbour stations notified <input type="checkbox"/> Crew notified about arrangements for: ➤ Vessel alongside <input type="checkbox"/> ➤ Gangway and accommodation ladder <input type="checkbox"/> ➤ Mooring plan <input type="checkbox"/> ➤ Tugs <input type="checkbox"/> ➤ Pilot ladder <input type="checkbox"/> To Master ➤ Are there any concerns? <input type="checkbox"/> <input type="text"/> To Duty officer ➤ Are there any concerns? <input type="checkbox"/> <input type="text"/> To forward and aft stations ➤ Are there any concerns? <input type="checkbox"/> <input type="text"/> To lookout and helmsman ➤ Are there any concerns? <input type="checkbox"/> <input type="text"/>	To Master Vessel alongside at berth <input type="checkbox"/> All stations informed <input type="checkbox"/> Any problems during berthing recorded <input type="checkbox"/> Critical equipment issues immediately reported <input type="checkbox"/> To Duty officer Pilot away <input type="checkbox"/> Pilot ladder secured <input type="checkbox"/> Forward and aft secured <input type="checkbox"/> Fire lines rigged <input type="checkbox"/> Bridge secured <input type="checkbox"/> Engine room notified <input type="checkbox"/> Gangway rigged <input type="checkbox"/> To Look-out Appropriate flags displayed <input type="checkbox"/> Bridge secured and cross-checked <input type="checkbox"/> To Bosun Gangway access manned <input type="checkbox"/>

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Improved “Checklist from Marine FRAM

Different separate Steps, Different separate Agents / Responsibilities

Classic Prescription Error Example - Hollnagel

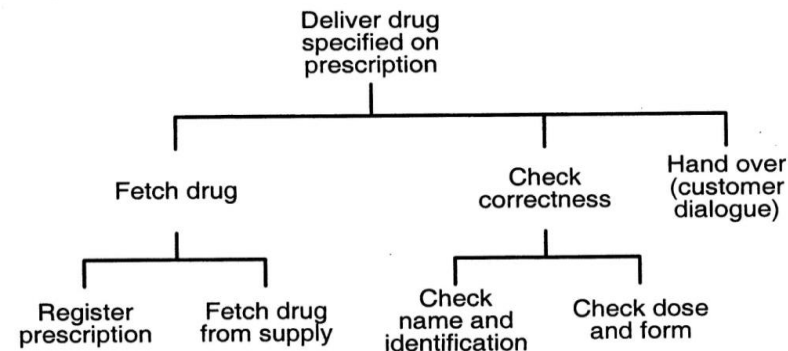


Figure 6.2: Functional decomposition of drug dispensing procedure

Medication errors in England

237 million

drug mistakes are made each year

28% could cause moderate or severe harm

700 deaths caused by errors

22,300 more deaths could be related to mistakes

Source: Manchester, York and Sheffield Universities

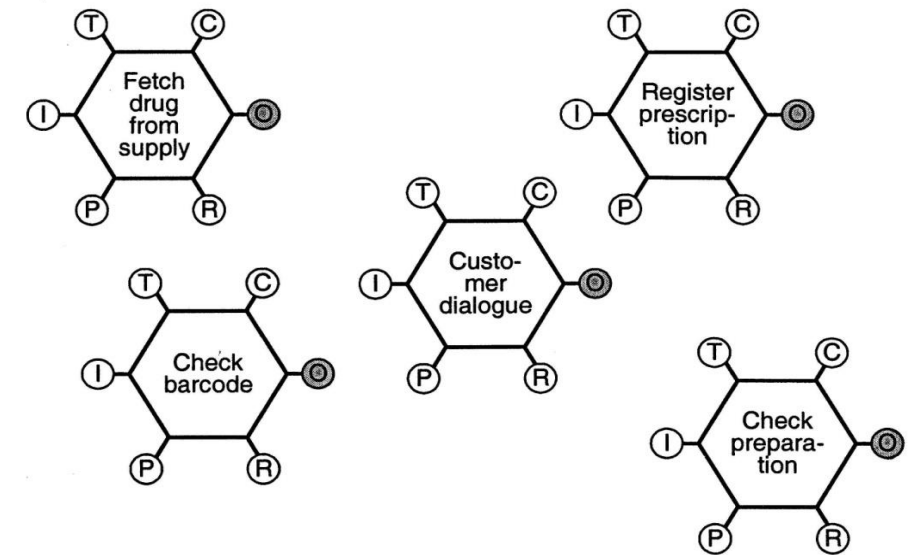
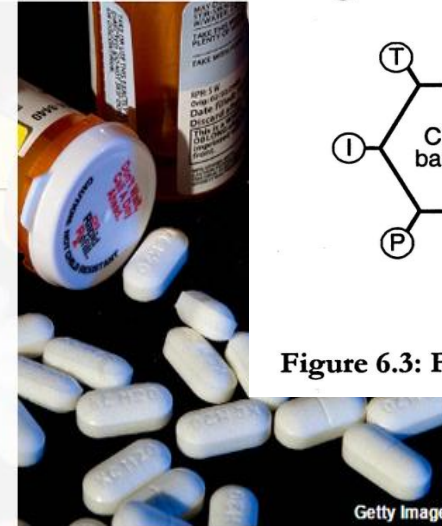


Figure 6.3: FRAM representation of drug dispensing procedure

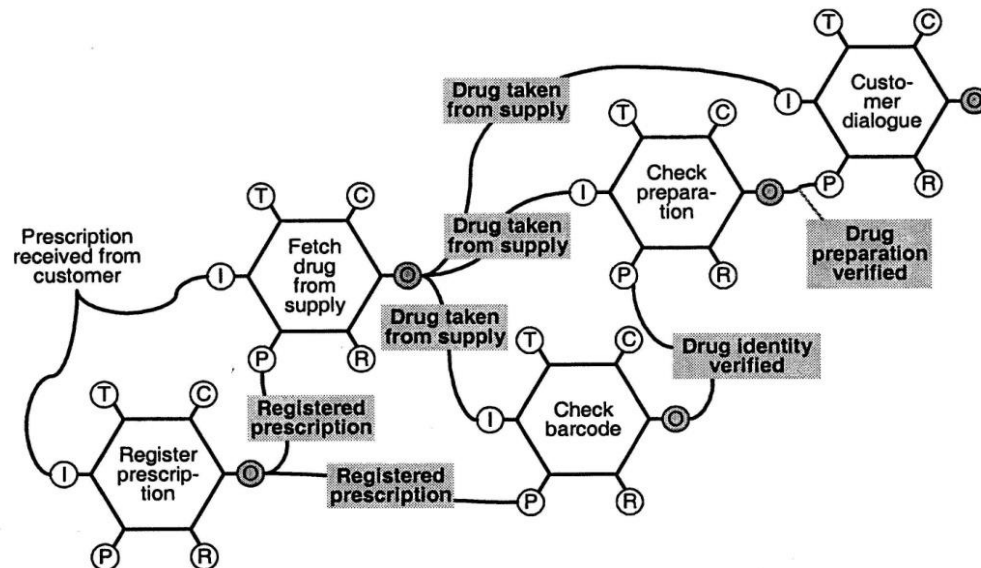


Figure 6.4: FRAM network for expected function connections

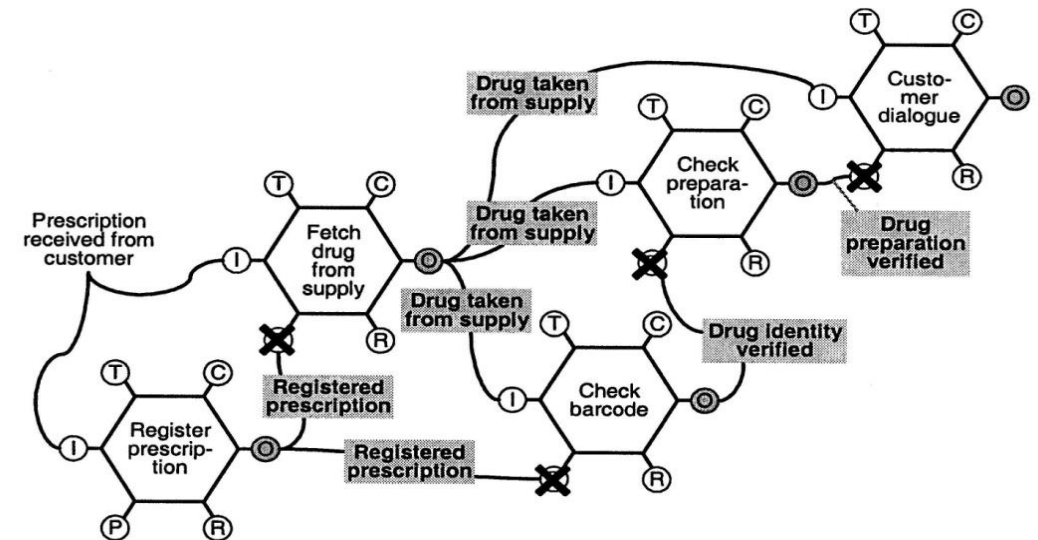
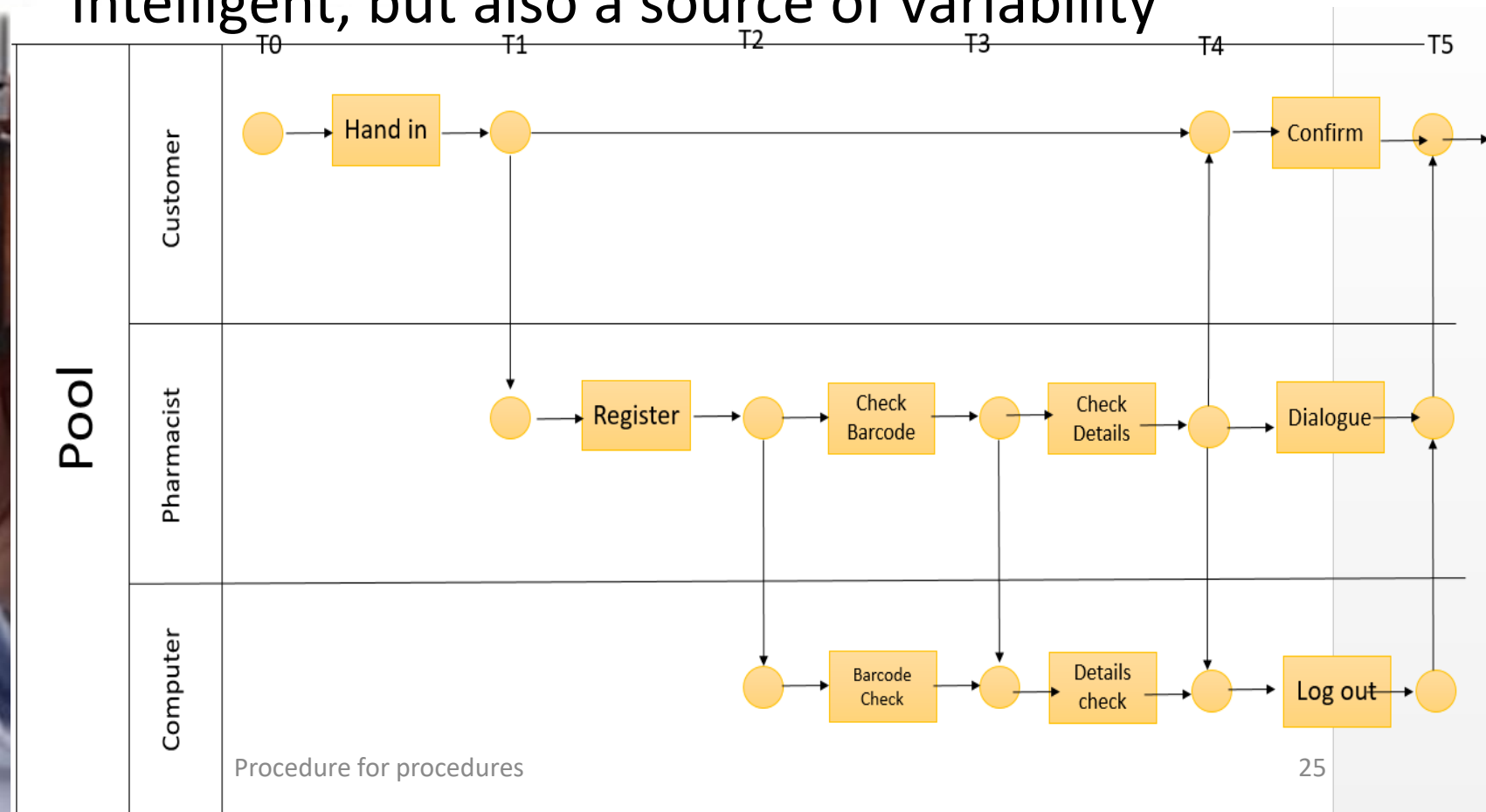


Figure 6.5: FRAM network for unexpected function connections

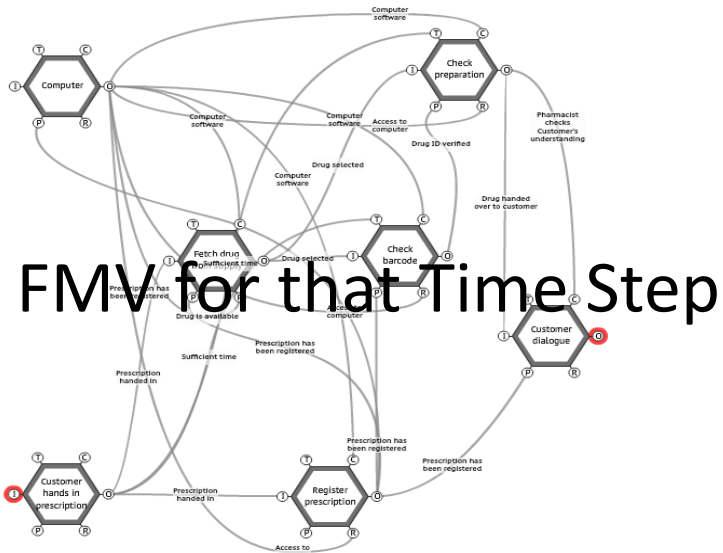
Procedure for procedures

The Prescription Drug Issuance BPM

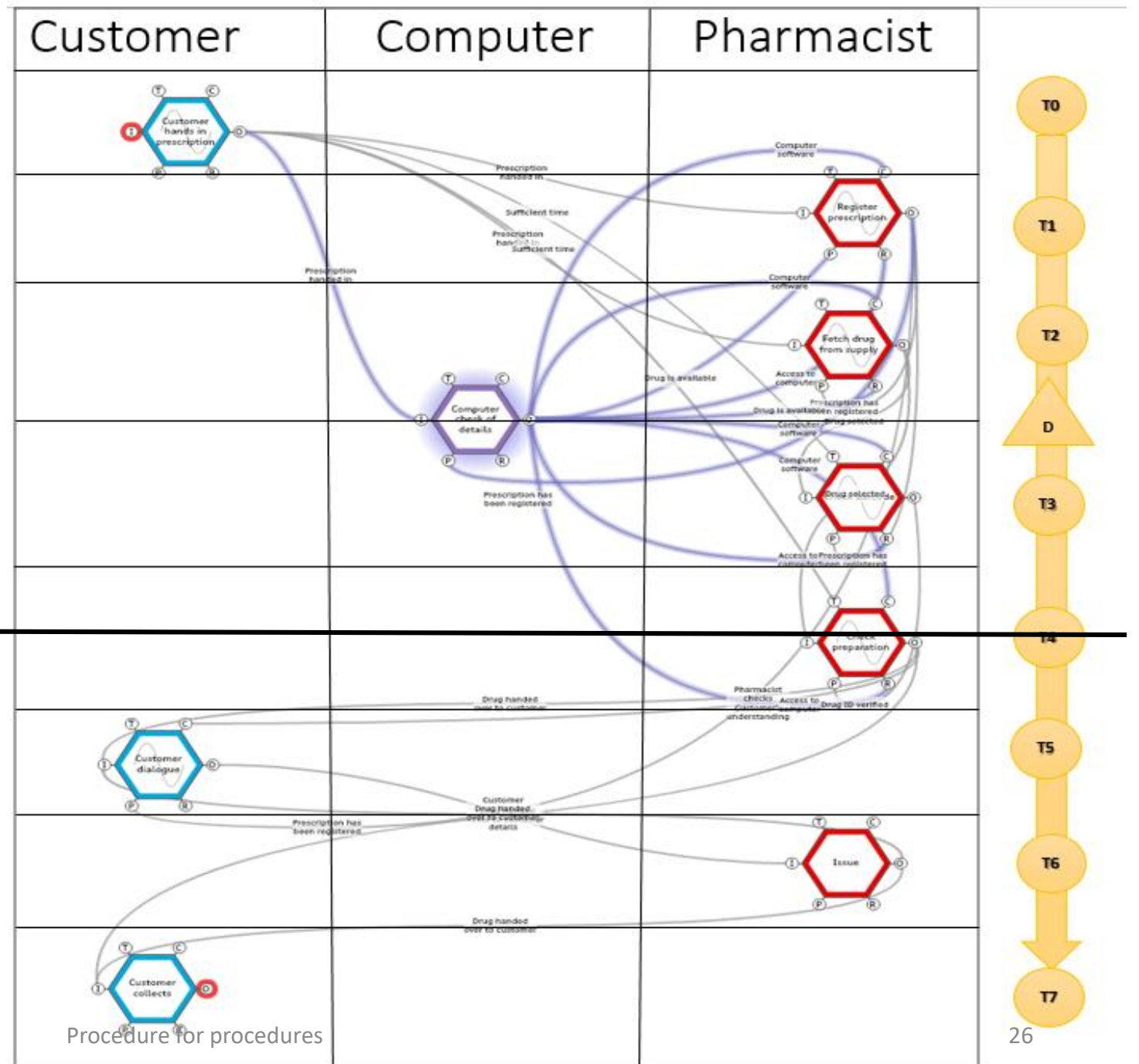
- Different , emerging Steps in a procedure
- Different swim lanes for the different Agents
- Note the Computer is treated as (Artificially) Intelligent, but also a source of variability



The BPM sequence of FRAM Functions needed



FMV for that Time Step



Next Steps? - Permit to Work?

WHO NEEDS TO BE APPOINTED/ SPECIFIED/ INVOLVED?

The Functions / Roles required:- (Actors – Swim Lanes?)

- Originator
- User
- Authoriser
- Issuer
- Performer
- Area Controller
- Site Checker
- Isolating Authority

SEQUENCE NEEDED? (STEPS AND TIMING?)

- *Request > Issue > Sign Off > Display > Action/ Handover > Handback > Check / Record*



Summary – A “Procedure for Procedure Development”?

Essentially its an Orchestrated, Choreographed sequence of FRAM analyses.

1. Research the PROCESS needing a Procedure – what is its objective – INTENT?
2. Interviews and Observations – FAMILIARISATION
3. Identify STEPS, FUNCTIONS, CRITERIA, CONSTRAINTS needed for each step.
4. Map out a Draft FMV for the OVERALL SYSTEM functions and BOUNDARIES
5. Draft out a BPM flow chart for PROCESS FLOW
6. Facilitate a TEAM (QUALITY CIRCLE) WALK THROUGH (REVIEW / HAZOP?) of the whole Process, step by (FRAM Instantiation) Step – What if Variabilities, criticalities, consequences, continuous improvement record.
7. (Re)Write consensus procedure, test practicality/ compatibility/ sign off