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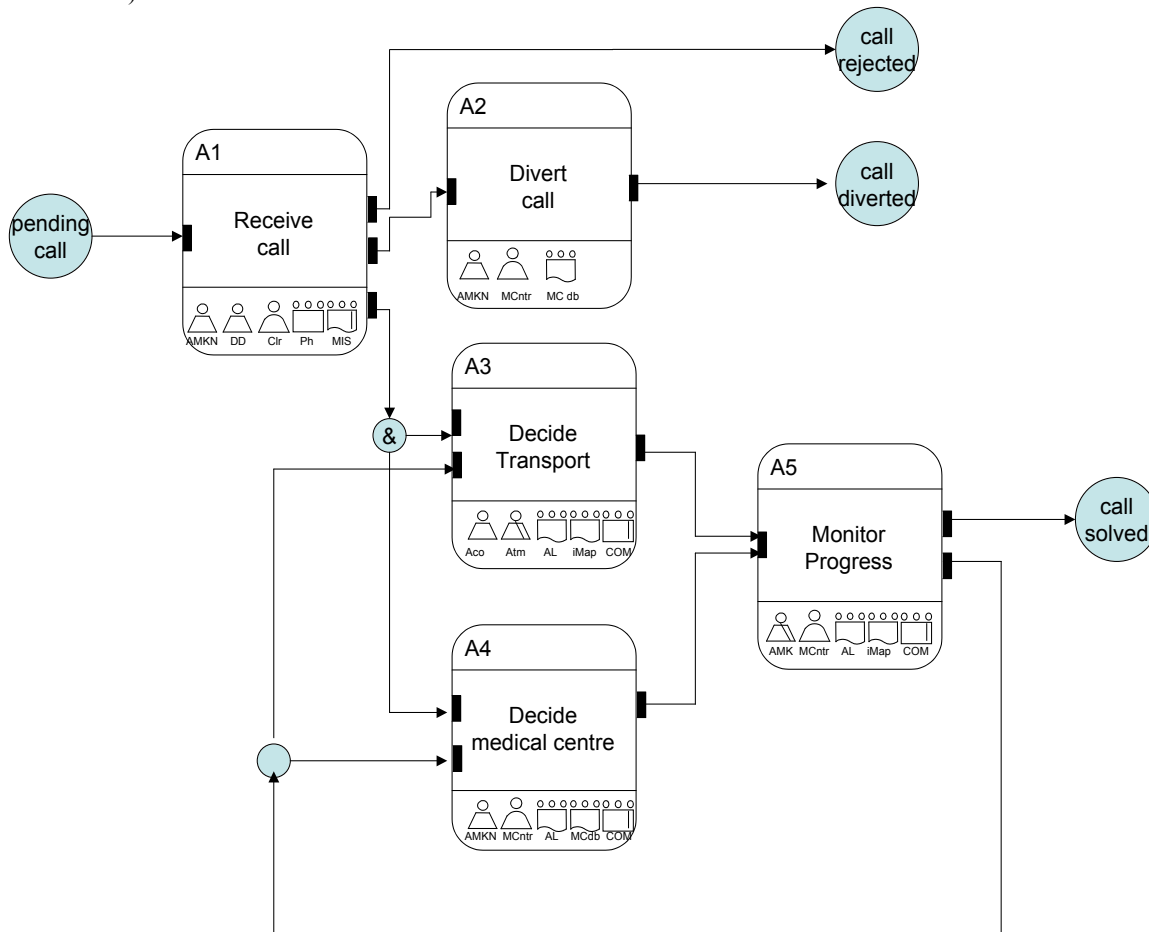
Sensuren faller i uke 24

Hjelpemidler: **D**: Ingen trykte eller håndskrevne hjelpemidler tillatt. Bestemt, enkel kalkulator tillatt.

En veiledende vektlegging av oppgavene er indikert med prosent.. Korte og presise svar premieres!

Oppgave 1 – Prosessmodell APM (30%)

a)



The APM workflow model for AMK Call handling has one start state "Pending Call", in which a call is waiting to be answered, and three end-states:

- 1) "Call rejected" - in which the caller has been rejected without any further action
- 2) "Call diverted" - in which the call has been decided as not an emergency but where the patient is provided with "phone support" from a medical unit.
- 3) "Call solved" or "case solved", when a patient has been delivered to a handling medical emergency centre.

A1 Receive call

The AMK nurse answers a call and decides whether or not the call should trigger further action. Calls that should not trigger any further action are rejected immediately.

Resources:

- AMKN: The AMK Nurse answering the call
- DD: Doctor on duty, this is not a required resource; the case description only says that a doctor is "sometimes" present.
- Clr: The caller. The caller is modelled as an agent, meaning external to the organisation that this workflow takes place in. It is unclear whether or not the caller should be modelled as a resource at all, as the caller is an external participant to the whole process (not only the receive Call task). In this proposal we have modelled the caller here, in order to show the way of modelling him/her, but it is left out for the rest of the process.
- Ph: The phone or phone system used for answering calls.
- MIS: The AMK Nurse has at her disposal a variety of medical information systems (MIS), as described in the case and detailed in task b) of this proposal. We have modelled this as a compound resource, as any one – or several – of them is used to answer a given call.

A2 Divert call

If the AMK nurse decides that the call is not an emergency, but the caller should get the opportunity to talk to medical personnel capable of handling phone inquiries, she diverts the call to an adequate medical centre.

Resources:

- AMKN: The AMK Nurse
- MCntr: The medical centre that the call is diverted to. The centre is modelled as an agent, deemed external to the AMK organisational context.
- Mcdb: The database of available medical centres
- Ph: The phone or phone system used to divert the call

A3 Decide transport

The Ambulance coordinator of the AMK evaluates the position and condition of the patient and decides which ambulance team should handle the situation. We have assumed that the helicopter (Air ambulance) is simply an ambulance team as any of the regular ambulances. This process is run in parallel with A4.

Resources:

- Aco: The AMK Ambulance coordinator
- Atm: The ambulance team getting the call.
- AL: The actionlog; the ambulance coordinator uses this in order to get information about the condition and location of the patient.
- IMap: The electronic map and positioning information system
- COM: Communication equipment needed to contact ambulance teams. We have used the compound resource here, as it is not quite specified which communication facility is used to call out the ambulance team. Later in the process, the use of radio is specified, and it is a fair assumption that this is used here as well.

A4: Decide Medical Centre

The AMK Nurse checks the list of available acute medical centres and calls around in order to find a capable centre that is willing to accept the patient. This process is run in parallel with A3.

Resources:

- AMKN: The AMK Nurse
- Mentr: The receiving medical centre
- AL: The action log from which the information regarding the patient is extracted and transferred to the medical centre. The action log is also updated with the information about which centre is being used.
- MCdb: The database of available medical centres
- COM: Communication tools used to contact the medical centres. In most cases this would be the phone/phone system, but could also be hospital internal calling.

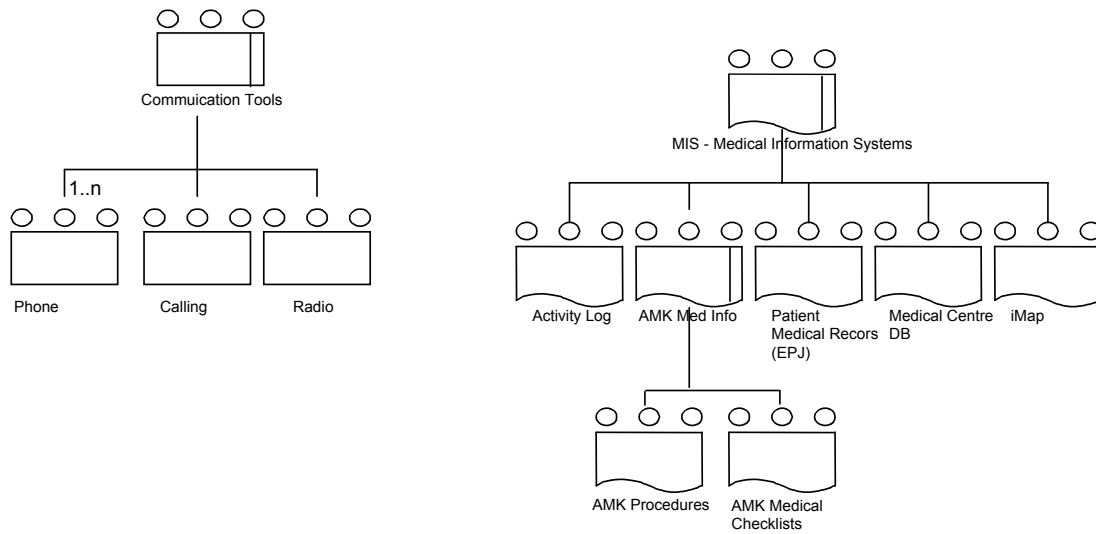
A5: _ Monitor progress

The AMK team together monitors the progress of the situation, while keeping contact with the caller and the ambulance team and coordinating the ambulance team and the receiving medical centre. If a breakdown of some kind occurs, this will trigger A3 or A5 (or both) to start over.

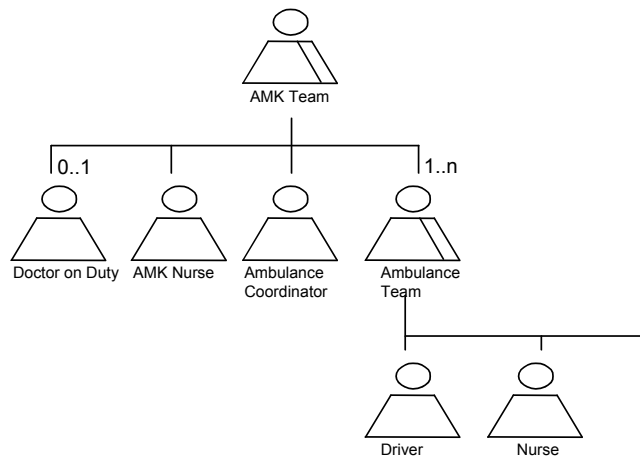
Resources:

- AMK: The AMK team. The AMK nurse is keeping contact with the caller and the medical centre while the ambulance coordinator is in contact with the ambulance team. All (or most of) the AMK team actors are involved in this activity so we apply the composite/compound resources
- Mentr: The receiving medical centre
- AL: The action log that is continuously updated during the process
- iMap: The map/positioning system
- COM: Communication tools in use

b)

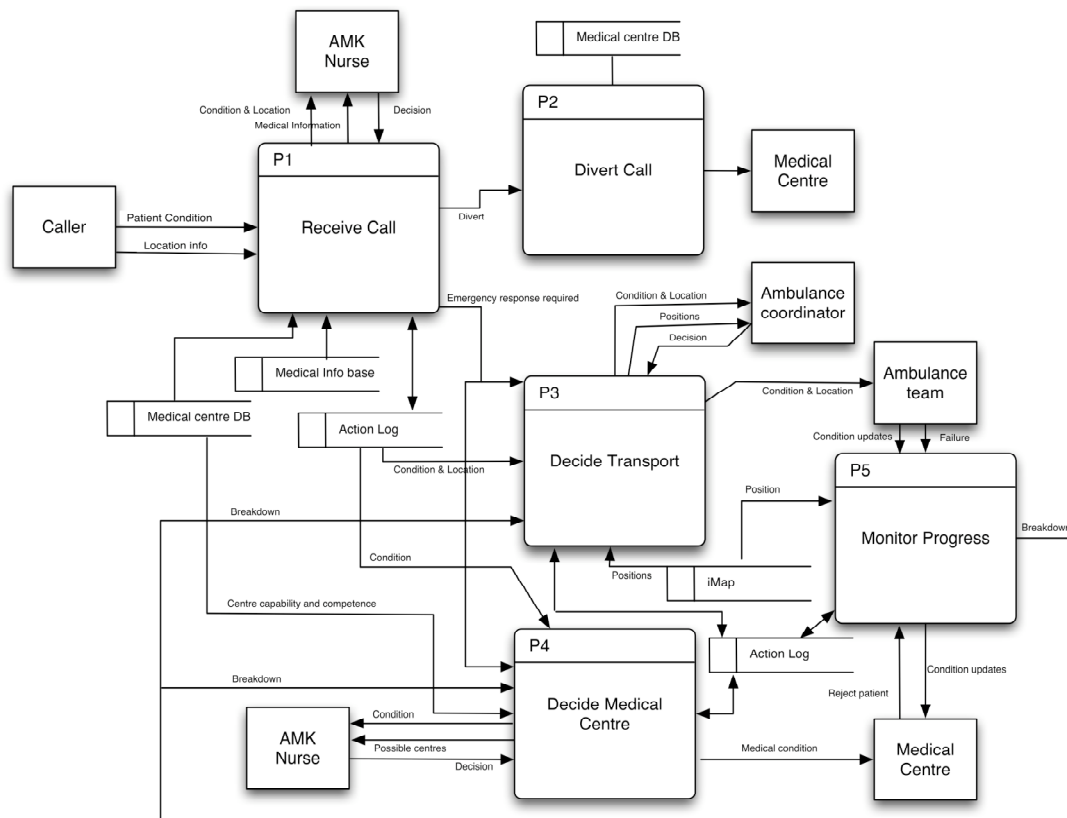


The tool resources are shown above. Cardinalities on sub-resources are one unless otherwise stated. Most of the resources are explained during the presentation of the model in a). The composition of AMK procedures and AMK medical Checklists into AMK med info, is not presented in the Case, but is assumption done here.



The actor resources are shown above. We have only modelled the actors that are deemed as part of the AMK organisation, as other actors are modelled in the process as agents (i.e external to this process). An Ambulance team are considered a composite actor since a team will consist of several persons, driver, nurse and possibly more people in the case of an air ambulance – this is again an assumption made here, and not explicitly mentioned in the case.

c)



External Agents

All of the external agents here are explained in the APM and APM resource models presented above. Some actors such as AMK Nurse and Medical Centre are repeated in the diagram in order to enhance readability.

Processes

The processes in this DFD diagram are similar to the ones of the APM model from a). Flows are explained below. Some flows in the diagram (particularly regarding decisions) are rather control-flow than data-flow, but they are included in the diagram to indicate the “information” that triggers other processes. An example is the initial decision from the AMK nurse in P1, that either terminates the process immediately or triggers P2 or P3 and P4. The nurse’s decision does contain information however and her decision is stored in the activity log.

P1 Receive Call

The process receives information on the medical condition and location of the patient from the caller and transmits this information to the AMK Nurse. In general this is agent to agent communication, but some of this is to be stored in the Action log and is hence modelled. In order to provide the AMK nurse with relevant information, the process reads from several medical information systems and the database of medical centres. The action log is both read and updated. The AMK nurse makes an initial decision on rejecting or diverting the call or to trigger an emergency response. Information regarding the nurse’s decision is stored in the Action Log.

P2 Divert call

Information about the decision to divert the call is received from P1. The db of medical centres is read in order to determine a proper receiver for the diverted call.

P3 Determine transport

Information regarding the patient's condition and location is read from the Action Log and is transmitted to the Ambulance coordinator. Positions of the ambulance teams are read from the iMap system and transmitted to the ambulance coordinator. The decision of the coordinator triggers the condition and location information to be sent to the chosen ambulance team. The action log is updated with information regarding the selected team.

P4 Determine medical centre

The AMK nurse receives information about the patient's condition (read from the action log) and a list of possible medical centres (from the Med centre db). Her decision on which medical centre to be used is stored in the action log and all relevant information regarding the patient's condition are transmitted to the Medical Centre.

P5 Monitor progress

The Action log is continuously updated with information from the ambulance team and from the caller regarding the patient. Condition updates are transmitted to the medical centre. Should the medical centre for some reason reject the patient or the ambulance team fail to pick up the patient, this information is stored in the action log and will trigger breakdown information to be sent to processes P3 and P4 that will have to be run again. Once the case is solved the record in the action log will be finalised.

Oppgave 2 – Modellkvalitet, kvalitetsrammeverket (10%)

- a) Gi en kort (maks 2 setninger) definisjon av de 3 kvalitetstypene
1. Syntactic quality: The goal of syntactic quality is to ensure syntactic correctness which means that all statements in the model are according to the syntax of the modelling language ($M \setminus L = \emptyset$)
 2. Semantic quality: There are two semantic goals; Validity and Completeness: Validity means that all statements made by the model are correct and relevant wrt. the domain ($M \setminus D = \emptyset$). Completeness means that all relevant statements of the domain are made explicit in the model ($D \setminus M = \emptyset$)
 3. Pragmatic quality: The goal of pragmatic quality is that the model is understood, an individual actor shall have understood the parts of the model relevant to her/him.
- b) Sammenlikn APM modellen og DFD modellen du lagde i oppgave 1 basert på de to kvalitetstypene semantisk og pragmatisk kvalitet.

This is a question that is meant to trigger a general discussion about the appropriateness of the two models with respect to the case and a perceived audience rather than a detailed evaluation of each of the two models. No specific audience for the models are mentioned, hence an answer will have to handle this in a very generic way or make assumptions about different audiences for the different models. The most generic answer achieves this directly by rather discussing *language appropriateness* with respect to the goals of semantic and pragmatic quality for this particular case description.

Semantics: The process described in the case has a workflow flavour, the case emphasises the sequence of tasks and the needed resources. A good APM model of this case is able to capture the process logic and the flow of all the activities mentioned. It should be possible with APM to reach the semantic goals of validity and completeness.

At the overall level (which should be the level of the model according to the task), the selected process in the DFD model is the same as in the APM, even if this is certainly not always the case. No other processes can be detected at this level, and the case does not emphasise “information management processes”. The DFD model further emphasises flow of information (i.e. the data flows). Information flows are not explicitly mentioned in the case, so most of these have to be “guessed” or constructed by the modeller. It is therefore difficult to evaluate whether or not all modelled flow is “relevant” (valid) or captured (complete) with respect to the case description. Some flows in the DFD model is rather control flows than data flow, even if they do contain some information that is to be handled by the system. All statements in the case regarding resources have to be transformed into Datastores or External agents or dropped.

Pragmatics:

To be completed.....

APM model seems to be more appropriate for this case descript

Additional points for 2b.

- Data resources needed for multiple processes have to be represented several times, making for possibility of confusion (pragmatic quality)

Oppgave 3 – Kravspesifikasjon - Use Case (25%)

a) There should be two use cases, as below. The second one is obviously much more brief. The first one should make note of an extension point. The second one should also indicate how it extends the first one. The format should be as below.

Use case name: Determine Best Line of Action

Summary: the AMK nurse and the ambulance coordinator will cooperate on determining the best line of action and then monitor it through to completion. They are responsible for determining the kind of transportation best suited given the situation and location of the patient and at the same time determining which medical care center should handle the patient once the pick-up has been made.

Basic course of events:

2. This use case begins when the AMK nurse has decided that the call is indeed an emergency situation.
3. The AMK nurse alerts the ambulance coordinator about the call.
4. The ambulance coordinator will check the iMap system and select the nearest available ambulance team
5. The ambulance coordinator will send information about the case to the ambulance team
6. The ambulance coordinator begins an activity log for the patient
7. Extension point: Use Case Monitor Progress
8. The nurse checks a database of available medical centers to see if any nearby centers have available capacity and competency to handle the patient
9. The nurse calls the first candidate medical center to negotiate delivery
10. The nurse arranges delivery
11. The activity log is automatically sent to the receiving center
12. The use case ends when the delivery is arranged and the log is sent.

Alternate course:

In step 4, if the ambulance cannot pick up the patient for any reason, the ambulance coordinator contacts a different ambulance crew. This involves consulting the iMap system again.

Alternate course:

In step 7, the first candidate might not be able to handle the delivery. In this case the nurse calls the next center, and so on, until a suitable center is located.

Use Case Name: Monitor Progress

Summary: this Use Case extends Determine Best Line of action. It involves the continuous monitoring of the patient delivery.

Basic course of events:

1. This use case starts when the ambulance coordinator has assigned a patient to an ambulance crew, and has started the activity log for the patient.
2. The ambulance coordinator is in radio contact with the ambulance crew.
3. The ambulance coordinator adds to the activity log if any important developments occur.
4. The AMK medical team conveys important messages between the ambulance and the receiving center if necessary.
5. This use case ends when the patient is delivered at the receiving center.

Alternate course:

In step 4, if the message involves an inability of either the ambulance crew or receiving center to complete their task, control is returned to the main use case.

b)

1. Acquire discriminating requirements: often, the features offered by every competing product are able to fulfill the initial requirements. It is therefore important to order requirements such that some sub set of products is not able to fulfill some of the requirements. Of course it might turn out that some requirements discriminate between products one way, while others discriminate in another. Trade-offs have to be made, perhaps by rating requirements to see which are most effective.
 2. One way to do this is by using card sort, where users sort cards containing product names according to whether or not they meet certain requirements.
 3. This is especially useful in the early stages of acquisition where products are selected through supplier-given information.
4. Try to get requirements that can be broken down into tasks that achieve goals. One way to do this is with use cases. The product can then be evaluated by using a complex scenario, to see how it copes with various parts of the overall goal.
 1. Useful in supplier-led demonstrations, where the supplier can often try to "hijack" the session by showing the best parts of the product. Test cases can be used to force the supplier to show how the product would cope with actual user needs.
 2. Also useful in customer-led product exploration, where the test cases can be used to see how easily the product can be used to achieve the desired goals.

Oppgave 4 – Brukergrensesnitt - MMI (10%)

a) Hva slags informasjon ønsker en å fange opp i oppgavemodeller.

Oppgavemodeller beskriver hvilke mål brukeren ønsker å oppnå og den naturlige sekvens av (del)oppgaver som trengs for nå målet. Modellene er gjerne hierarkiske, slik (del)oppgaver på ett nivå blir mål på nivået under, helt til et passe trivielt nivå. Innenfor hvert nivå beskrives gjerne bruk og bearbeiding av informasjon og sekvens-beskravninger (sekvenser og valg).

Det er vanlig å beskrive dette for både eksisterende praksis (for å finne forbedringsmuligheter) og ønsket utførelse med nytt system og brukergrensesnitt (som krav til nytt system).

b) Hva er forskjell på Use-Case-beskrivelser og oppgavemodeller.










Oppgavemodeller fokuserer på hva som er meningsfylt for enkeltbrukeren, ikke på systemet som sådan (aktører i Use-Case-diagrammer kan være både personer og andre systemer). Oppgavemodeller er tradisjonelt hierarkiske, mens Use-Case-diagrammer er flate. Oppgavemodeller støtter seg gjerne på/inkluderer konseptuelle modeller. Oppgavemodeller kan omfatte dagens praksis, og er mer detaljerte enn Use-Case-diagrammer for å kunne fungere som spesifisering for dialog(modeller).

c) Bruk av begrepsmodeller

- Oppgavemodeller inneholder hvordan brukeren bruker konkrete data til å ta beslutninger og hvordan dataene bearbeides (begrepsmodeller kan oppfattes som del av oppgavemodell).
- Dialogmodeller angir hva slags data som er output/input til/fra brukeren gjennom de ulike dialogelementene (og hvordan data disse produseres/konsumeres av systemfunksjoner). Det er også relevant hvordan dataflyt aktiverer/deaktiverer dialogelementer. Begrepsmodellen gir føringer på hvilke dialogelementer som nødvendigvis må være med, men ikke når og hvordan.
- Konkret design dekker bl.a. hvordan data visualiseres og hvordan lavnivå interaksjon gjøres om til data.

Oppgave 5 – ERP systemer (25%)

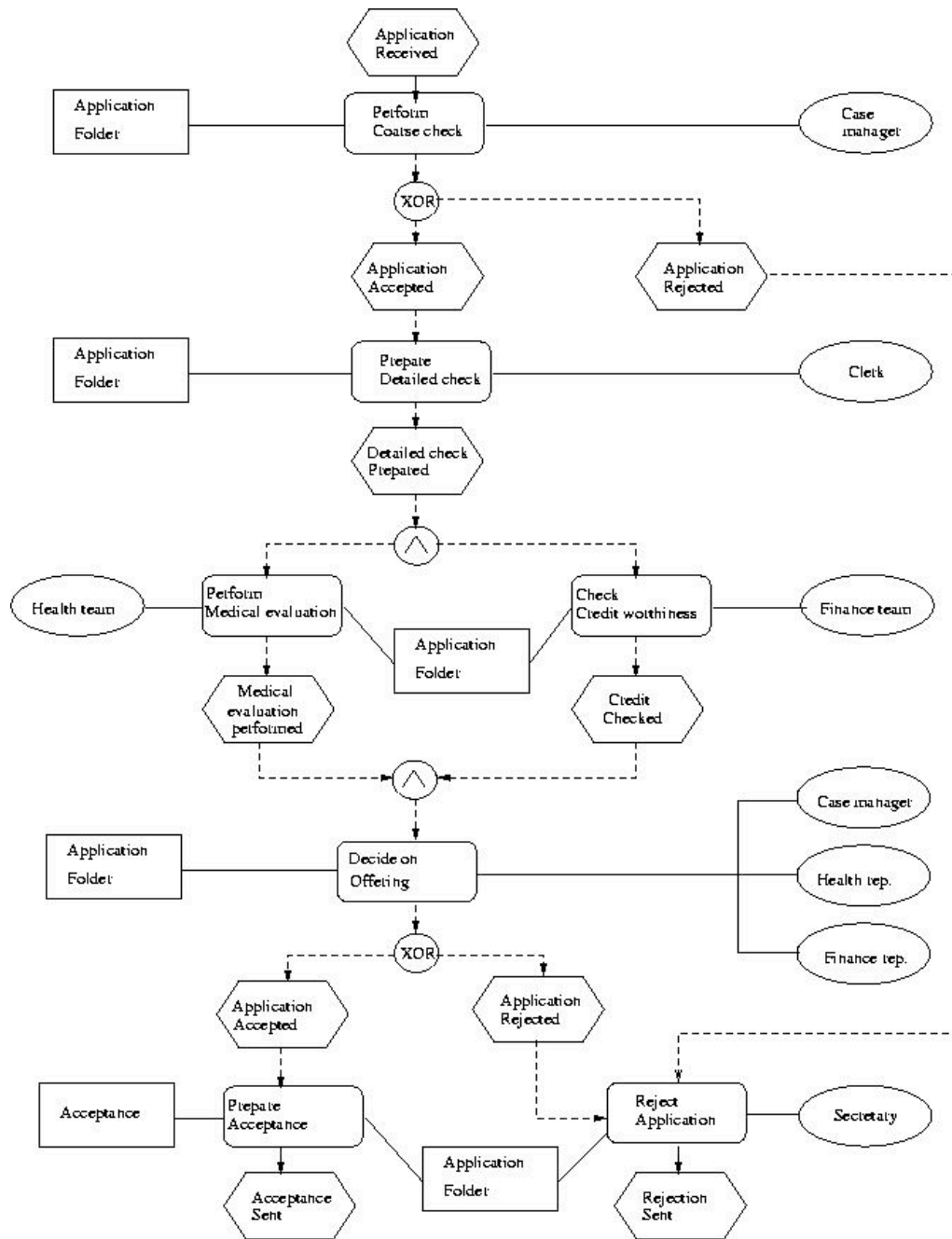
a)

| Designation | Icon | Definition | Example |
|--|---|---|----------------------------------|
| Event |  | Events describe the occurrence of a status that in turn acts as a trigger. | Order is received |
| Function |  | Functions describe transformations from an initial status to a final status. | Verify order |
| Organization unit |  | Organization units describe the outline structure of an enterprise. The organization units in the R/3 system are system organization units. | Sales organization |
| Information, material or resource object |  | Information, material, or resource objects portray objects in the real world (e.g., business objects, entities). | Sales order Inspection result |
| Process path |  | Process paths show the connection from or to processes (Navigation aid). | Delivery processing |
| Logical operator |  | Logical operators describe the logical relationships between events and functions or processes. | "XOR", "AND", "OR" |
| Control flow |  | Control flows describe the chronological and logical interdependencies of events and functions or processes. | |
| Information/material flow |  | Information/material flows define whether a function is read, changed, or written. | |
| Resource/organization unit assignment |  | Resource/organization unit assignments describe which unit (employee) or resource processes a function or process. | |

b)

Here is a suggested EPC solution. Important points of difference between APM and EPC. These are things to watch as you judge the proposed solution.

1. Events have to be made up for EPC to terminate and begin processes
2. Ports translated to logical connectors
3. How do they handle the two ways of rejecting an application? I chose to move "reject application" to the end. This is not the only solution (in fact it changes the APM), so there might be other possible solutions.
4. The application folder is tricky. How do they show it is important for all processes? Clumsy. Do they realize this applies to the earlier question on pragmatics?



CASE: SAMTALEHÅNDTERING I AMK SENTRALER

Akuttmedisinske kommunikasjonsentraler (AMK sentraler) utfører koordinering av ambulanser, vaktleger, sykehusressurser og andre aktører ved akutte medisinske behov i befolkningen. AMK sentraler er i de fleste (men ikke alle) tilfeller tilhørende et sykehus. Denne case beskrivelsen beskriver hvordan en nødsamtale håndteres i en AMK sentral.

En AMK sentral er bemannet med en eller flere spesial sykepleiere (AMK sykepleiere), en ambulanseskoordinator og i noen tilfeller en vaktlege. Flere ambulanseteam og i enkelte tilfeller også en luftambulans er underlagt AMK sentralen. AMK sentralen må samarbeide med ulike medisinske enheter som skal ta i mot og behandle en pasient, så som akuttmottaket ved de omkringliggende sykehus, legevakt, primærhelsetjenesten etc.

En AMK sentral er utstyrt med en rekke forskjellige teknologiske hjelpemidler: Kommunikasjonsverktøy som telefoner, ambulanseradio og sykehusintern calling. Digitale kartsystemer ("iMap") med posisjonering og sporingfunksjonalitet for ambulanser. Medisinske informasjonssystemer som Aktivitetslogger, Elektroniske pasientjournaler, AMK prosedyrebok, medisinske sjekk-lister og databaser over alle medisinske nødenheter som kan ta i mot akutt-tilfeller og deres kapasitet og kompetanseområder.

Når AMK sentralen mottar en nødoppringing vil AMK sykepleieren forsøke å vurdere situasjonen ved å intervju innringeren. Noen ganger vil en oppringing ikke trigge en nød respons; situasjonen kan vurderes som ikke prekær og samtalen kan avvises eller settes over til en annen medisinsk enhet som kan håndtere telefoner slik som legevakt eller primærlegetjenesten. AMK sykepleieren må ta disse avgjørelser gjennom å følge prosedyreboken, konsultere aktivitetsloggen fra tidligere hendelser eller medisinske sjekk-lister, og i noen tilfeller ved å konferere med en vaktlege. Hver samtale dokumenteres gjennom opprettelsen av et mottaksnotat i AMK aktivitetsloggen. Mottaksnotatet brukes og oppdateres gjennom hele prosessen.

Hvis en nødrespons skal iverksettes, må AMK sykepleieren og ambulanseskoordinatoren samarbeide om å finne den beste løsningen og deretter overvåke situasjonen til problemet er løst. De må bestemme hva slags type transport som kan anvendes gitt pasientens lokasjon og medisinske tilstand og samtidig finne en egnet medisinsk nødenhet som kan behandle pasienten. Deretter er de ansvarlig for all koordinering mellom ambulansen og nødenheten helt frem til pasienten er levert.

Når det gjelder transport, må ambulanseskoordinatoren sjekke iMap systemet og velge det nærmeste ledige ambulanseteamet. I noen tilfeller vil en luftambulans bli rekvirert. Så mye informasjon som mulig om pasientens medisinske tilstand trekkes ut av mottaksnotatet og oversendes til ambulanseteamet slik at disse kan forberede seg. Ambulanseskoordinatoren holder radiokontakt med ambulanseteamet helt til pasienten er levert til den valgte medisinske nødenheten. Aksjonsloggen oppdateres kontinuerlig med informasjon om pasientens tilstand, basert på rapporter fra ambulanseteamet.

For å ta en beslutning om hvilken medisinsk nødenhet som skal håndtere pasienten, må AMK sykepleieren slå opp i databasen over tilgjengelige nødenheter og forsøke å finne noen som har kapasitet og kompetanse til å håndtere denne type situasjon. Hun må deretter kontakte de aktuelle for å koordinere mottaket. Ofte vil dette kreve en rekke oppringninger til ulike enheter og en god dose forhandling for å finne en nødenhet som vil ta imot pasienten. Så snart en nødenhet har akseptert oppdraget, vil all informasjon fra aksjonsloggen oversendes til enheten og ambulansen underrettes om hvilken enhet som skal ha pasienten.

AMK teamet er deretter ansvarlig for å overvåke, koordinere og utveksle informasjon mellom ambulanseteamet og nødenheten. Hvis ambulansen av en eller annen grunn ikke kan plukke opp pasienten likevel, situasjonen endres slik at nødenheten ikke lengre vil ta imot pasienten, eller prosessen bryter sammen på en eller annen måte, må AMK teamet begynne på nytt og finne en annen form for transport og/eller en annen medisinsk nødenhet. Så snart pasienten er levert til nødenheten avsluttes aksjonsloggen og prosessen stopper.