

If you limit your choices only to what seems possible or reasonable, you disconnect yourself from what you truly want, and all that is left is a compromise

Robert Fritz

THE EARTHQUAKE PROGRAM PLAN

AMC – EPIC COMPANY

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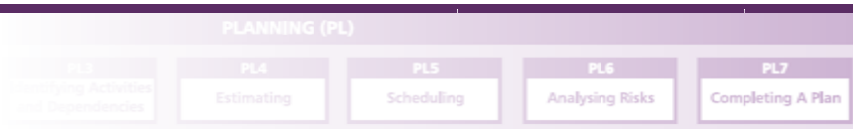
Whenever I hear, 'It can't be done', I know I'm close to success

Eric Celeste

You have to recognize when the right place and the right time fuse and take advantage of that opportunity. There are plenty of opportunities out there. You can't sit back and wait.

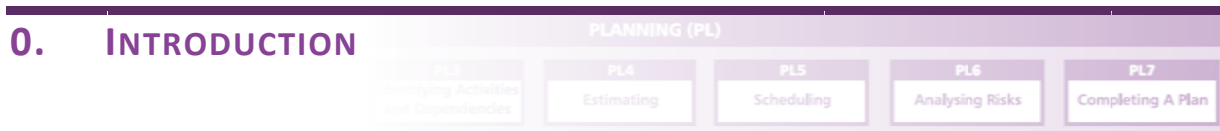
Ellen Metcalf

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0. INTRODUCTION



“The difficulty lies, not in the new ideas, but in escaping the old ones”

John Maynard Keynes

The healthcare is rapidly changing, in order to meet all the requirements of the patients and the environment it is necessary to improve or better ourselves. See the Academic Medical Center (AMC from now on) as a patient. The patient is able to function fine, but has some problems with his heart. A couple of years in the future the patient die due to a cardiac arrest.

When we do not improve ourselves the ‘health’ of the AMC is decreasing and it will be more difficult to deliver the best care possible. In order to overcome this decrease of ‘health’ it is necessary to replace some body parts (applications) and it is also necessary to replace our heart (the Norma application). Our new heart and body parts are delivered by the EPIC Company [1]. The replacement of applications will be elaborated later on in this document. **Argumentation 0.1** – *Epicenter and Chronicles are delivering the backbone of all the applications provided by the EPIC Company, it is not possible to go around these applications. Norma is also storing all the patient data, but I assume that Norma will be redundant and therefore no longer necessary to maintain when the Epicenter and Chronicles are fully operational.*

The initial decision to implement the EPIC has been made by the Board of Directors, the EPR strategy changed from ‘best of breed’ to ‘best of suite’. This may feel as an earthquake which tremble the entire (IT) organization. At the heart of the earthquake we have the Epicenter and when the trembling is over we can endeavor the new situation our organization is in. These situations like an earthquake or a patient with a bad cardiac condition we do not feel comfortable to be in, but sometimes it is necessary to accomplish a change in the entire organization.

In this document several factors are discussed; implementation effort of the organization, organizational structure and risks (this will give an insight in the feasibility of the program). In order to assess these several factors the objectives of the program plan are discussed. First there will be a short overview of the current situation and the new applications of the EPIC Company are introduced. Last-but-not-least the reasons why to strive to the new situation will be discussed, to some extent it a reason was already mentioned in this introduction.

Secondly the implementation strategy is discussed, in this section the overall program is divided into pieces and a path is created to implement these pieces to finally arrive at the completion of the program (the implementation of the EPIC applications as decided by the Board of Directors).

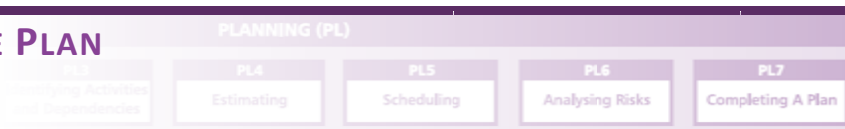
After the discussion about the implementation – the third section – the organization of the project will be discussed. In this section subjects like responsibilities, decision making and involvement of stakeholders will be elaborated upon. In the subsection of responsibilities questions like who is responsible for what part will be answered. In the decision making subsection the questions about where are decisions being made and by whom are answered. The last subsection will elaborate on the stakeholders involved in the project (and its organization).

The fourth section is about the milestones of the project, what is delivered throughout the program and the fifth section is related to all other sections questions are answered like what are the risks of this AMC wide program?

Two notes in advance: my own argumentation as the manager of the program has been written down in italics; color of the text is purple and will be preceded by the word argumentation (which could already be seen in this section). For example: *Argumentation 1.1 – some arguments*. By which the argumentation is numbered according to the section it is in (and numbered consecutive throughout the subsections, if any), the numbering of the argumentation starts all over again when a new section is putted forward. When assumptions are made they are also accompanied by argumentation, in the text it will be made clear which part is the assumption and which part is the argumentation (most of the times argumentation and assumptions are interweaved).

The other note is that the words departmental and division or divisional are not interchangeable with each other and they do not hold the same meaning. For example: the department Cardiology means something else as the division Cardiology, the division could have more departments in it.

1. OUTLINE OF THE PLAN



“Chance favors the prepared mind”

Isaac Newton

Before discussing the program objectives, implementation strategy, organization, milestones and risk management it is necessary to elaborate on the current situation (which applications are at stake) and the movement towards the new situation (with a short explanation about the applications delivered by the EPIC Company). After this section the other topics will be addressed. **Argumentation 1.1** – *it is necessary to understand what function is provided by which application, this is especially the case for the offered applications by the EPIC Company. When healthcare professionals see the advantages of the new applications they are more willing to cooperate.*

1.1. CURRENT SITUATION

Before this program was started the EPR strategy of the AMC was the ‘best of breed’. Which means select the best application for a specific job and replace the old application when the new application was the best of breed. The ‘best of breed’ strategy results in applications which are specialized for a single group of physicians or a department [2].

The applications that the Board of Directors would like to replace are listed below (for an overview of all applications in the AMC, see **Appendix A – Figure 1**):

- **Patient administration:** this application is all about the registration of the patient at the AMC. Data of the patient is entered in this system (like demographic data, general information, health insurer and so on). Scheduling is not possible in this application.
- **Patient/Appointments:** this application is for scheduling appointments and allocating resources in the AMC. The program is called X/Care.
- **Order management:** this is the CPOE system of the laboratory and it is only used there.
- **Care desktop:** the care desktop is the view box. A lot of applications are presented as a whole system in the care desktop. The user can access all interconnected applications and has to login only once.
- **Medicator:** is the application for prescribing medication to patients from the hospital (both inpatients and outpatients). Medicator has a direct connection with the Pharmacy Department.
- **OK-Plus:** the OK-Plus application is the application for the operating rooms. Its features are to create schedules for the operating rooms and store documentation of the patients who are in the operating rooms.
- **PDMS:** the PDMS system is currently in use in two closely connected departments; the Anesthesia Department and the Intensive Care Unit. Data (both general information about the patient and data collected during the stay on one of the departments) is stored in the PDMS system and it is possible to review the data.

For a more complete overview of the applications see the presentation of P.J. Bakker [3]. Unfortunately the architecture of the AMC its application is spaghetti-like. It is difficult to change and adapt these spaghetti-like architectures [4]. With all those different applications it is almost impossible to implement workflow and decision support and that are two approaches the AMC would like to achieve [3].

What can be seen in the divisional structure of the AMC is that several departments have their own applications and some of these applications have the same functions as other applications of other

departments. ***Argumentation 1.2** – When doing projects during internships on several departments, I always noticed some applications which are featured with redundant functions. This is because divisions have their own IT-staff and they create their own applications when deemed necessary without researching the applications of other departments.*

1.2. MOVING TOWARDS THE NEW SITUATION

As mentioned earlier there is a need for a change, reasons for changing the EPR strategy to ‘best of suite’ are:

- **Need for speed:** clinicians and the environment (patients, government) do expect, for different reasons, a hospital environment where most of the data is entered and exchanged electronically.
- **Increasing costs:** as a result of the ‘best of breed’ strategy the costs of integrating the different applications are increasing, as are the efforts to maintain the situation [2].
- **Difficult to take the next step:** with all those different applications it is almost impossible to implement workflow and decision support. As a result of that the AMC is not able to take the next steps in EPR development.

Eventually the EPIC Company is able to deliver the applications necessary to – at last – be able to take the next steps. The applications the EPIC Company has proposed (the information about the applications is directly coming from [5]):

- **Epicenter:** is the backbone of the EPIC’s system. Every EPIC application accesses data from Epicenter and data entered by any user is automatically stored in Epicenter and available to others throughout the AMC.
- **Chronicles:** is a foundational component of Epicenter. Chronicles extends strictly relational data tables with multi-valued attributes and time dimension, optimizing them for record searches and record updates. Chronicles is also – officially – called Chronicles Extended Relational Database Management System.
- **MyChart:** gives patients controlled access to information in their EPIC medical records, just by using a standard Web browser.
- **EpicCare link:** is an application for referring physicians. For these healthcare professionals it is possible to get a secure web-based access to information about the care the AMC provides their patients.
- **EpicWeb:** allows authorized providers to log into the EPIC system from any PC with a Web browser. There are no limitations about what can be done from the other PC.
- **EpicCare inpatient:** EpicCare inpatient spans hospital departments and specialties, giving providers the tools they need to deliver safe, high-quality care.
- **EpicCare Ambulatory:** document and correlate clinical data. EpicCare is also an active clinical assistant that helps to sort through patient information, identify what to do next and contribute to population management.
- **Epic onhand:** runs on Windows Mobile devices, where users have the option of linking to EPIC’s central data repository over a wireless network.
- **ASAP:** supports busy emergency department providers with convenient features for care management and instant access to up-to-date patient information.
- **EpicRX:** contributes to safe, effective medication use in hospital environments by helping pharmacists manage the verification and dispensing process.
- **OpTime:** helps to improve the surgeon productivity, room utilization and data access in both inpatient and ambulatory surgical environments. It also provides efficient workflows for scheduling, documentation and follow-up activities.

- **Inpatient ICU:** supports users in super acute, comprehensive care, and interventional care environments, combining the functionality of our core clinical systems with targeted features and information displays.

1.3. THE ADDRESSED TOPICS

The program objectives will be stated in the next section, than it will be clear what we are trying to reach with this AMC wide program. **Argumentation 1.3** – *these objectives are needed to continually reflect the progress of the plan whether or not we are going in the right direction.*

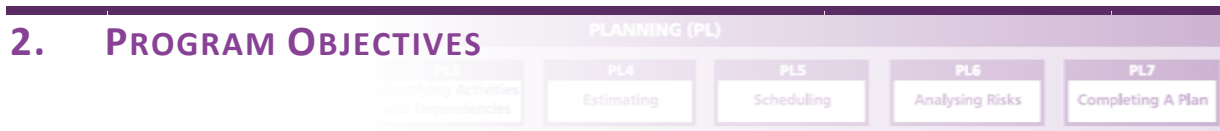
Because it is an AMC wide program it is necessary to break up the program into subprojects. The section Implementation Strategy will go deeper in this matter. When subprojects are created it is necessary to define the order and dependencies of the subprojects. **Argumentation 1.4** – *the latter two remarks are very important, when the program is divided into subprojects it is necessary to keep a complete overview of the progress made by all subprojects. It must be clear in which order the subprojects have to be carried out, in that way all the collaborating staff knows when to participate in the program. In order to save time and that people would not have to wait for each other.*

All projects have to be organized, that is way this is also a section in this program plan it is important who has responsibilities to whom, who makes the decisions and which stakeholders are involved. **Argumentation 1.5** – *when it is clear who has responsibilities to whom and for what, it will be easy to approach people when something goes wrong and do something about that. Closely related to responsibilities are decisions, who will make the decision? For all people it is necessary to know who is involved in the decision making process, in that case people can easily ask the people who are in charge for adjustments, report progresses and ask for extra resources. It also creates clarity and less chance for miscommunication and tension between people.*

Milestones are set in this program and it will be clear to everyone when subprojects, parts and tasks have to be completed. This is closely related to the organizational part of the program. **Argumentation 1.6** – *when milestones are set, people know exactly what will be expected from them and that gives clarity. Clarity will reduce the chance of tension between people and therefore less chance that the program will fail.*

Related to all sections of this program plan is the risk management. Implementing an AMC wide program will have some risks attached to it. It will cost a huge amount of money as mentioned earlier by the Board of Directors and therefore it is also necessary to elaborate on the risks and even manage them. **Argumentation 1.7** – *when identifying these risks at forehand of the implementation process, it will be easier to reduce the possibility of a risk that it will occur. Precautions can be taken to prevent risks from occurring and stimulate people to let the program to succeed.*

2. PROGRAM OBJECTIVES



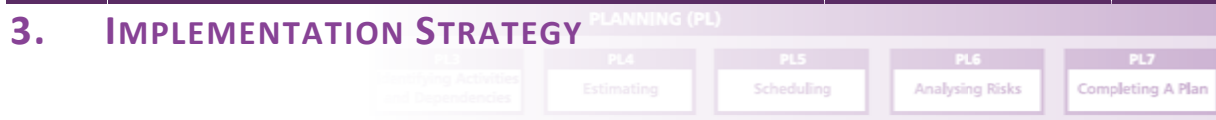
“This one step -- choosing a goal and sticking to it -- changes everything”

Scott Reed

The program has several objectives, these objectives are:

- **Decrease costs of maintenance and integration:** as mentioned earlier the costs are increasing due to the ‘best of breed’ strategy. This will change with the implementation of this program, the ‘best of suite’ strategy results in decreasing costs and takes less time to get familiar with and to implement [2].
- **Enable the possibility to take the next step:** with implementing this program it will be possible to use workflow and decision support and using additional functionality (as described in section 1.2).
- **Increase standardization:** in the ‘best of breed’ strategy professionals have to get familiar with every new application what is the ‘best of breed’ in a certain area. Applications with the same functionality or applications at the same department could have quite different interfaces and procedures, this causes professionals to follow extra training and professionals may be dissatisfied to learn a new application again [2]. The ‘best of suite’ strategy provides the applications of one vendor and therefore increases standardization, procedures and interfaces are the same throughout the package.
- **Increase accessibility for research:** When all records are structured the same way (not like the paper records in use nowadays in the AMC) it is easier to extract data for usage in research [3]. Research is one of the strategic objectives of the AMC [6]. *Argumentation 2.1 – Research can lead to new insights which in turn can improve insights in healthcare or even lead to major breakthroughs, and for an academic medical center like the AMC this should be tempting. That is why it is mentioned as an objective of this program.*
- **Facilitate (much) better support to the healthcare professional in daily practice:** with this program the infrastructure will be improved and healthcare professional have easy access to patient records and are mobile, because they can access the Electronic Patient Record (EPR from now on, EPR has the same meaning as Electronic Medical Record) everywhere at any time; patient information throughout the entire hospital and outside for the healthcare professionals who are authorized. Again this meets one of the strategic objectives of the AMC [6].
- **Improve communication/transparency with/to other professionals and patients:** General Practitioners can easily have access to the EPR’s of patients who are referred by them to the AMC. The General Practitioners could have access via the Internet to the EPIC system and see what treatment has been given at the AMC. Secondly it will be possible to provide the patient access to its own record; they can see what has happened in fact they are requesting it already [7-8].

3. IMPLEMENTATION STRATEGY



“A man may die, nations may rise and fall, but a good strategy lives on. Good strategies have endurance without death”

John Fitzgerald Kennedy

Because of the impact of the program and the AMC wide dimension of the program, the program will be split up in (some) subprojects. In order to make the overall program a success the order of the subproject is described and also the dependencies are described.

3.1. SUBPROJECTS OF THE PROGRAM

It has to be mentioned that there are major challenges when implementing this entire program. All the healthcare professionals and employees (like administrative clerks and so on) have to be trained. While the program is progressing, the continuity of the healthcare processes has to be maintained. This is also mentioned by other hospitals who implemented the EPIC applications [9].

First of all temporary staff has to be attracted to the AMC. The temporary staff can overtake the (regular) healthcare processes, so there is time for the AMC staff to get involved in the project. ***Argumentation 3.1** – it is necessary to involve the healthcare professionals and employees of the AMC in the program, eventually they are the end-users who have to work with the applications. The AMC staff has to know how they have to work with the applications; what are the possibilities of the applications that will be used, what can and can't be done with the applications. It takes care that the AMC staff feels more connected with the entire program.*

- **Implementation of the backbone:** the backbone of the EPIC applications are Epicenter and Chronicles, these have to be implemented at first in order to provide possibilities to implement the other applications of the EPIC Company. ***Argumentation 3.2** – as stated on the EPIC website [1] and in the promotional material of EPIC [5] it is necessary to implement these two applications. Without these applications it is not possible to implement other applications, it is noticeable that EPIC would not implement other applications if these applications are not implemented.* The Epicenter and Chronicles applications have to be implemented at a central place, end-users do not have to have these applications installed and implemented on-site. ***Argumentation 3.3** – this overcomes the problem of redundancy, only at one place the data is stored. It is no problem that these applications may use several servers as long as data is stored singularly. For backups mirror servers are required (that is the only redundancy that is allowed).* At this time no disruption of regular healthcare is required, it is just providing a foundation to the program.
- **Connecting the backbone:** all other applications (also of the AMC) will be coupled with the backbone. Norma will be no longer necessary and will be removed (when all the connections work fine and no application causes problems during and after the new connections); the backbone applications of the EPIC Company have several interfaces to connect with other applications which are not from EPIC, preferably this will be done in the weekend. New data is stored in the backbone applications while the older data is transformed and stored in the backbone applications. Later subprojects will be connected directly to the backbone. ***Argumentation 3.4** – because of the ‘best of suite’ approach this will also be the backbone of the entire AMC hospital. EPIC’s applications are centered on these two applications. It would be much easier to maintain a centralized database structure than a spaghetti database structure and integrations are easier made [4, 10]. It will also be easier for the other subprojects to fit in the overall picture of the program. All the AMC applications have to be coupled; the ones that will*

not be replaced by EPIC components will be prepared to communicate with the backbone and will be coupled. The coupling of the old applications which will stay in place after the entire program is finished, could be tiresome and cause problems (like time delays) for the entire program.

- **Implementing Model System:** with the implementation of a model system it is easier to learn and understand the applications faster than when only training is used. For end-users it is possible to define which configurations or specifications are needed, the Model System is based on the best content and workflows used at the customers' sites of the EPIC Company [1]. The Model System can be used as a preliminary training to let the AMC staff get familiar with the applications.
- **Implementation of EpicCare inpatient and ambulatory EMR:** in all AMC departments the EpicCare inpatient will be implemented. Healthcare professionals can follow online training programs in order to get more familiar with all actions. The implementation process can be done division by division so that the implementation team has only to focus and concentrate on several (or even one) division.
Argumentation 3.5 – before going to use these applications in the real world the AMC staff has to have some training in the program, 24 hours seems sufficient for physicians [9] and with additional online training the staff can get familiar with all the ins and outs of the application. Trainers are available to help the staff with problems for the first month after the implementation. Patient administration, Patient and Appointments, CPOE will be replaced and the Care Desktop will be removed, all auxiliary applications of the AMC which were connected to the Care Desktop will be connected to the Epicenter and Chronicles.
- **Implementation of departmental applications (ASAP, OpTime, EpicRX and Inpatient ICU):** the implementation of the departmental applications can occur parallel; it is not necessary for the ASAP implementation to wait until when the OpTime application has been implemented. *Argumentation 3.6 – these applications are stand-alone applications, they are departmental and therefore it is possible to simultaneously implement these applications. For the EpicRX application the functionality of ordering can be added to the EpicCare applications when it is fully implemented. End-users use till that time the Medicator application which is currently in use in the AMC. Inpatient ICU replaces the PDMS system, OK-plus will be replaced by the OpTime application. EpicRX will replace the Medicator application.*
- **Implementing auxiliary applications:** these are the e-Health applications and the Epic onhand application. This subproject has a low importance. *Argumentation 3.7 – the Epic onhand application delivers extra functionality; the functionality is required, but it is nowadays also not available. This means that other subprojects require more attention and finally this subproject has to be implemented. The same holds for the e-Health applications these are required and definitely speed up and improve the healthcare process, but the options are available right now; patients can see their own record (it takes some time to find them), General Practitioners could call the specialist when information about their patient is required and accessibility for physicians by Internet has to wait until the implementation of other projects has finished or when the implementation of these applications does not slow down the entire program.*
- **Go live:** an application has been implemented and is ready for use. The staff will be trained (whether by online training, with the help of a trainer from EPIC or by a superuser at the department) in using the program. When the users are familiar with the application at hand they will use it instead of the old application. Before the end-users are going to use a new application the data of the old applications have to be transferred towards the new application (which means an alteration of the Chronicles database to store the new data of the old application, which can be accessed by the new application). *Argumentation 3.8 – the transfer of data is needed at forehand (this will be done during the 'connection to the back-bone' subproject), otherwise the staff has to work with two applications which have the same function, for a period in time. This is not advisable because the staff may enter new information into the old system or get confused when to use which application.*

Every subproject will be followed by a 'go-live' activity by which the applications that have been implemented will be tested and validated. When a 'go-live' activity is initiated the EPIC Company has some trainers on standby to help the AMC staff to work with the application at hand, the temporary staff can take over some of the workload during the training times.

3.2. THE ORDER OF EXECUTION OF THE SUBPROJECTS

In this subsection the order of execution will be discussed, the dependencies of subprojects will be elaborated upon in the next subsection. The subprojects are defined in the previous subsection. Here the different subprojects are listed in chronological order:

- **Implementation of the backbone**
- **Connecting the backbone**
- **Implementing a Model System.** *Argumentation 3.9 – with the Model System the last requirements can be detected, these can be requirements that are only noticeable when the superuser works with the program. Before implementing all the other applications it would be wise to use the Model System first and then it will be easier for all AMC staff to work with the final applications.*
- **Implementation of EpicCare inpatient and EpicCare Ambulatory**
- **Go live.** *Argumentation 3.10 – when the EpicCare inpatient and EpicCare Ambulatory are fully implemented at the departments where these applications are required, it is necessary to test whether or not these two important applications fulfill the requirements of the end-users and see whether or not extra training is required.* During the 'go live' sessions there will be a trainer from the EPIC Company and the superuser of the department available for questioning and help, to an extent of two weeks. Thereafter a superuser can be contacted however the superuser is not available at a 24/7 rate. End-users can also use the online training program to learn and recover knowledge about the applications; this online training program is offered by the EPIC Company [1].
- **Implementation of departmental applications**
- **Go live.** The same possibilities are offered here as with the 'go live' session of the EpicCare inpatient and EpicCare Ambulatory.
- **Implementing auxiliary applications**
- **Go live.** The same possibilities are offered here as with the 'go live' session of the EpicCare inpatient and EpicCare Ambulatory.

This will be the order of implementation. In the next subsection the dependencies between the several subprojects are discussed.

3.3. DEPENDENCIES BETWEEN THE SUBPROJECTS

No subproject should be started when the requirements analyses are not finished yet. These requirements have to be written down; the usage of the IEEE Standard is advisory [11]. *Argumentation 3.11 – for all people who are involved in the program it is necessary to have clear requirement documents, than everyone will know what is expected from the applications and the EPIC Company can feedback – via the program manager – to the end-users which requirements are possible and which are not.*

The biggest dependency of subprojects is of the first subproject the implementation of the first subproject; the implementation of the backbone. All other subprojects cannot proceed or even start when the backbone is not implemented.

Another dependency is the connection to the backbone; this dependency is closely related to the first dependency. When one subproject is not able to connect to the backbone it is a drawback, but still other

subprojects can proceed. Other problems can be detected in the 'go live' subprojects so steps can be easily undertaken to solve problems and other malfunctions.

The AMC wide EPR systems (the two EpicCare applications) will lose some functionality when a departmental application like EpicRX is not implemented or the implementation process has failed. This is at some point annoying or even frustrating, but in this case Medicator will not be replaced or removed until the EpicRX is fully operational. In the worst case scenario the AMC staff has to keep working with Medicator in this case. This holds for every departmental application that will be implemented during this program. **Argumentation 3.12** – *an old application will only be removed when the new application is fully capable to do the job. In this case it is not a fatal problem when the new application will not work, or when it only will work after a certain period in time of implementation.*

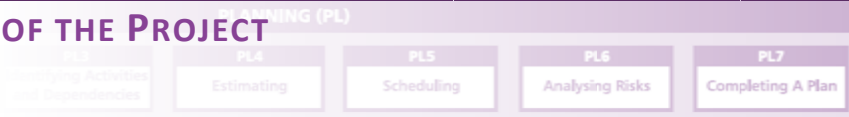
The auxiliary applications are dependent of the successful implementation of the two EpicCare applications. The auxiliary applications are not interdependent of each other. This is also the case for the separate departmental applications. Needless to say is that the 'go live' sessions are dependent of the subprojects in advance.

3.4. BASIC PRINCIPLES FOR THE PROGRAM

There are some principles that are of major importance for the program and that do have a lot of impact on the way the program is organized. These principles are listed below and are briefly elaborated upon.

- **Standardization:** Improving the standardization throughout the hospital is also one of the objectives of the program. Standardization is required in order to find the information stored again at a certain moment in the future. Even subprojects are standardized; there is one manager of the subproject. None of the old applications will be removed before the new ones are fully capable of taking over the functions of the old ones. This requires a lot of commitment of all the staff which is involved in the entire program (also the AMC staff).
- **Communication:** Is closely related to the next principle. Communication is needed to keep people involved in the subprojects and it is needed for identifying implementation problems, cultural problems, social problems and time delays. **Argumentation 3.13** – *it is always important to communicate, to keep an open mind in the program. When there is miscommunication or even no communication the entire program is doomed.*
- **Single point responsibility [12]:** When subprojects and the program are carried out, there must be a single line of communication between a subproject towards another subprojects and the overall program manager. In other words there must be only one captain at each ship. **Argumentation 3.14** – *when there are more captains at one ship there are conflicting interests and there can be several views about the program which clearly endangers the entire program. Meetings of the subproject group will give the other staff an opportunity to communicate with the captain and solve problems when necessary.*

4. ORGANIZATION OF THE PROJECT



“If one does not know to which port one is sailing, no wind is favorable”

Seneca

In this section the organization of the project is discussed. Responsibilities (who are responsible for what), decision making (where are the decisions being made and by whom) and the involvement of stakeholders (who are the stakeholders and what are their views, e.g. what do they expect from the project) are the subsections of this section.

4.1. RESPONSIBILITIES

- **The Board of Directors:** is responsible for making the resources available for the program manager to be able to execute his tasks. This means that the Board of Directors has to allocate funds and resources and they have the possibility to stop the entire program when that is in the best interest of the AMC.
- **The program manager of the AMC:** is responsible for the continuation of the entire program. It is his duty to take care of the progress and stay within the specified time and budget boundaries. Another responsibility of the program manager is to take appropriate action when that is required in order preventing the entire program being jeopardized. *Argumentation 4.1 – the program manager is the commander in chief of the program, he knows all the ins and outs of the program and therefore he is the authorized person to take actions when they are necessary.*
- **EPIC Company:** is fully responsible for delivering the applications that are a part of the agreement, during the implementation process they are also responsible for giving training to the superusers and help the end-users when the ‘go live’ subproject is launched. In the scope of training the EPIC Company will also offer the possibilities to all end-users to participate or use online training facilities. These online training facilities will be accessible at least until new upgrades are needed. When new upgrades are needed than the Board of Directors has to decide whether or not the AMC would like to continue collaboration with the EPIC Company. *Argumentation 4.2 – the training facilities are offered by the EPIC Company themselves, this is also a part of the agreement with the AMC.*
- **Subproject manager of the AMC:** the subproject manager has the same roles as the program manager of the AMC only at a more narrow scale. He or she is responsible for implementing the subproject as scheduled within the predefined boundaries. When something goes wrong the advisor of EPIC can be consulted what to do next and periodically the subproject manager has the responsibility to report the progress and everything that is directly and indirectly related to the subproject to the program manager of the AMC.
- **Advisor of EPIC:** is responsible for the communication between the implementation team of EPIC and reports his findings to the subproject manager of the AMC. Every advisor of EPIC is joined together with a subproject manager.
- **Implementation teams AMC and EPIC:** these implementation teams are responsible for the implementation of the project.
- **Superusers (could be department head, but that is not a necessity):** have to be trained to become some sort of expert users of the applications at hand. At a later stage in the program they are required (and they have the responsibility) to support the end-users. *Argumentation 4.3 – the EPIC Trainers will not be available 24/7 after a certain period of time. Superusers have the same job as the end-users and this will lower the threshold to ask for help by end-users than when the helper is from an external*

company somewhere in the United States of America. Superusers are extensively trained to get familiar with the applications at hand so they are able to offer help when necessary.

- **Department heads:** have the responsibility to report to the subproject manager when trainings do not succeed and users are not able to use an application and they have report to the subproject manager when the commitment of users is decreasing.
- **EPIC Trainers:** these persons are of EPIC can have the responsibility to train the superusers. At the 'go live' stage the EPIC trainers are also responsible to help end-users when they have questions about the system and help them to get familiar with the system.
- **End-users:** they are responsible for using the applications, when they encounter problems they can discuss these with the superusers or EPIC trainers and otherwise they can report them to the department head or subproject manager.

Superusers and end-users are the AMC staff who is working on the departments and divisions. Each department has at least one superuser in that case it is easy for all other staff to contact someone who has decent knowledge about the system.

4.2. DECISION MAKING

One statement in advance: The AMC must always stay in command of the entire program and implementation process even though the EPIC Company does (some of) the implementation. The AMC knows the best what is needed and the EPIC Company can support the AMC in reaching the best. *Argumentation 4.4 – because the AMC staff has to work with all the applications, they need to feel comfortable about the applications. They have to stay in charge during the entire program. The EPIC staff should always report, via a representative (a project leader), towards the AMC representative; the program manager.*

For a detailed picture see the diagram in **Appendix A – Figure 2**. Decisions are made throughout the several layers as depicted in the diagram. All the decisions that are of importance for the continuation of the program are made by the program manager of the AMC.

Subproject managers will make decisions about their area (the subproject); they have to get approval from the program manager of the AMC for (major) decisions which have to be made. Decisions which are affecting other subprojects have to be discussed with the subproject manager of the subprojects affected.

The EPIC Company has the possibility to decide which of their people are going to implement the system. The implementation crew of the AMC will be selected by the subproject managers and the department head of the ICT department.

End-users and superusers are involved in the decision making process by planning open meetings about the subprojects. *Argumentation 4.5 – users know what they like about the system and what they do not like about the system. When decisions have to be made the subproject manager will discuss the situation in the meeting, at that moment it is possible to ask questions, make remarks and do proposals. This will increase the commitment of the staff.*

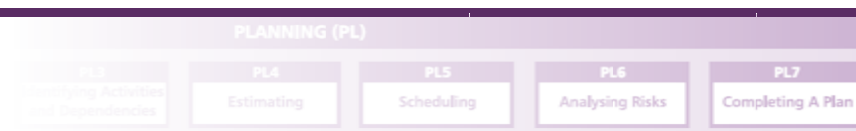
4.3. INVOLVEMENT OF STAKEHOLDERS

First can be said there are several stakeholders. Second, these stakeholders can be – from a geographical viewpoint – internally or externally situated. Third, the most involved stakeholders are already mentioned in this program plan. In this subsection the different stakeholders will be (shortly) discussed, the attention will be mainly focused on the viewpoints of these stakeholders. *Argumentation 4.6 – it is preferable to have the viewpoints of the different stakeholders at forehand. When viewpoints differ it can cause (some) friction between stakeholders who have opposing viewpoints [13]. At the other hand when viewpoints differ, most likely*

the proposed results of the program will differ. Differences in viewpoints can seriously jeopardize the entire program (stakeholders are doing what they deemed necessary). The (most important) stakeholders are listed below; first the external stakeholders (E) are mentioned and second the internal stakeholders (I) are mentioned.

- **[E] General Practitioners:** they would like to see a good working connection with the AMC, which makes it easier to access the patient information they have referred to the AMC.
- **[E] EPIC Company (all EPIC staff):** to my knowledge it is the first time for the EPIC Company that they are implementing in the Netherlands. This American company may have some other interests, like gaining a (firm) foothold in the Dutch (and even European) market. When the program succeeds it will positively influence their reputation and that may open doors. They would like to see that everything is implemented and works well.
- **[I] Board of Directors:** is responsible for keep the hospital running. They are responsible to the Dutch Government and they have to justify the budget spent on the program; they are very eager that the entire program will succeed, that it eventually cost less to maintain and integrate new applications.
- **[I] Program Manager:** the program manager is interested in getting the entire job done. He knows the objectives and the proposed results of the program and strives towards the languished situation.
- **[I] Project Managers:** reputation could be at stake when the subproject is not implemented according to plan. The project managers may only be interested in the subproject they are leading and looking at the results their subproject has to fulfill (and not the entire program, a project manager would not be interested in 'Enable the possibility to take the next step').
- **[I] IT Staff:** not every member of the IT staff will be doing every subproject of the program, the only results they may be interested in is getting the implementation job done. They may be not interested in the overall goals or proposed results of the program, this because they are only perceiving the new architecture at the software and hardware level and not perceiving what the end-users will notice.
- **[I] Physicians:** the physicians would like to have good applications that are clear, have the functionality needed and reliable. This in order to provide excellent care towards patients (the highest goal of a physician). Physicians are accustomed to work with the Care Desktop, so they expect that the program will be better than the Care Desktop. More general; physicians hope that the new program will result in better applications for getting the job done.
- **[I] Nurses:** Nurses are supporting the physicians and they are caring the patient throughout his or her hospital stay. Several applications are needed to make the process go smoothly. Like the physicians they hope that the new applications will be more accessible, more reliable and functional in order to take care of the patients.

5. MILESTONES



*“What we call the beginning is often the end. And to make an end is to make a beginning.
The end is where we start from”*

Thomas Stearns Eliot

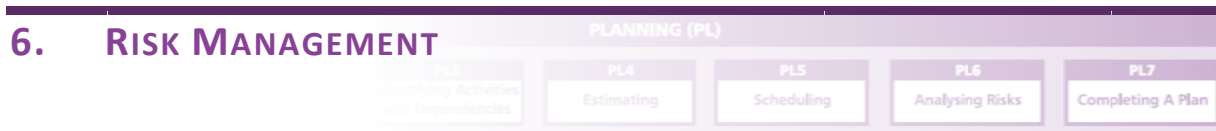
This program plan will not go in to detail about budgeting and planning. This has been discussed in the business plan which has been approved at an earlier state [14]. In this program plan some indications may be given, this should be kept in mind by reading this program plan and its milestones. More information about milestones can be found at this reference [10].

- **Program plan approved. *Argumentation 5.1*** – without approval of the program plan by the Board of Directors it is impossible to continue, so this will be the first milestone.
- **Infrastructure & hardware prepared. *Argumentation 5.2*** – when these two are in place the program can take off, without the required infrastructure and hardware it is impossible to start implementations.
- **Backbone implemented**
- **Backbone connected**
- **Testing connections completed. *Argumentation 5.3*** – it is nice to implement the backbone and make connections with other programs, but the infrastructure has to be thoroughly tested whether or not it is reliable, secure and accurate and performs accordingly.
- **Norma removed. *Argumentation 5.4*** – Norma is no longer necessary when Norma is stored in Chronicles and Chronicles is linked (via Epicenter) with all the other AMC applications.
- **Model System implemented**
- **EpicCare inpatient and ambulatory EMR implemented**
- **Testing completed ('go live' session successful). *Argumentation 5.5*** – EpicCare inpatient and ambulatory EMR has to be thoroughly tested whether or not it is reliable, secure and accurate and performs accordingly. These two applications will be the new Care Desktop and the AMC staff has to use these applications very often so the program will not continue until the testing is completed.
- **Patient administration, Patient and Appointments, CPOE will be replaced and the Care Desktop will be removed. *Argumentation 5.6*** – these applications have been fully replaced by the EpicCare inpatient and ambulatory EMR applications.
- **Departmental applications implemented. *Argumentation 5.7*** – these milestones mentioned below this milestone can be worked upon simultaneously. They are not interdependent.
 - ASAP implemented
 - Testing completed ('go live' session successful)
 - OpTime implemented
 - Testing completed ('go live' session successful)
 - OK-Plus removed
 - EpicRX implemented
 - Testing completed ('go live' session successful)
 - Medicator removed
 - Inpatient ICU implemented
 - Testing completed ('go live' session successful)
 - PDMS removed
- **Auxiliary applications implemented**
 - Epic onhand implemented

- **Testing completed ('go live' session successful)**
- **MyChart implemented**
- **Testing completed ('go live' session successful)**
- **EpicCare link for GP's implemented**
- **Testing completed ('go live' session successful)**
- **EpicWeb implemented**
- **Testing completed ('go live' session successful)**

As mentioned earlier not much can be said about budgeting and planning. In this program plan there is no planning for each milestone and also no budgeting. About the overall program can be said that it will take around two years until full completion.

6. RISK MANAGEMENT



“Great love and great achievements involve great risk”

Nepalese Saying

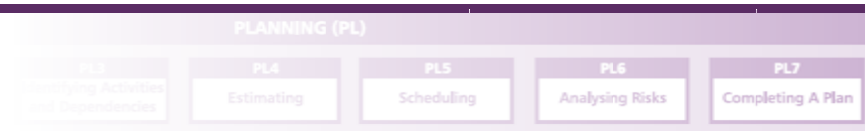
This is an AMC wide program and needless to say is that every program involves some risks [15]. The Earthquake Program also involves some risks. In this section not only the risks are mentioned, but also the measures that can be taken are reported here.

- **No experience with Dutch users:** in the business plan is elaborated on the choice of the vendor. The vendor that has been chosen is the EPIC Company. On their website they state they have a lot of experience (29 years to be exact) [1]. However it is not known what their experience is with Dutch users or even academic hospitals, they simply do not elaborate on that part. *Argumentation 6.1 – regulations and legislation are different among countries, it is necessary to know what kind of experience EPIC has with Dutch users and academic hospitals. When they are not that experienced in these two than EPIC itself can jeopardize the program, causing overflow in time and budget or even cancellation of the entire program. Before signing all the contracts and being at the mercy of EPIC these experience has to be thoroughly investigated.*
- **Reporting of budget-overflow by EPIC:** in the real world unforeseen events can happen. When these cause problems in budget and/or in time the EPIC Company should report on these problems to the program manager or to the Board of Directors immediately. *Argumentation 6.2 – when overflows of resources (time, budget, people and etcetera) occur they have to be reported directly, because than it is easy to interfere and do some changes to the subproject and may be even to the entire program. The EPIC Company has to report on these overflows because they are the ones who get paid to get the job done. It may be needed to actively request information about possible overflows (weekly or monthly).*
- **Miscommunication:** different people have different views. At all times there should be an open culture in the entire program. An open culture invites people to communicate with each other and be able to collaborate with each other. There should be one captain at each ship [15]. *Argumentation 6.3 – there is one captain at each ship, the overall program is commanded by the program manager and each subproject is managed by the project manager. Each two weeks the program manager, subproject managers, advisors of EPIC will come together to discuss the progress of the project (and program). The subproject managers will have to organize meetings with the superusers, department heads and – someone of the – implementation team AMC/EPIC in order to know what is going on.*
- **Projects should be next to the current operations:** the AMC is an academic hospital and has to be up-and-running 24/7. However there must be time scheduled for the AMC staff to participate in the program – this does also account for physicians and nurses. Extra staff should either be recruited or hired to take over the daily business when necessary. *Argumentation 6.4 – the extra staff must be qualified personnel that can take over the daily business, unforeseen emergent cases should always be treated by the regular personnel when necessary. The AMC staff will be more committed to the program when they are not only involved, but also have time to participate, during their shifts. When everyone is involved this can increase team spirit and working more together to get the job done.*
- **Risk allowance:** it would be unwise to think that there will not be any drawbacks during the implementation of the program. Therefore there must be extra time scheduled to capture risks. When there is almost no time available in a subproject and something goes wrong (a risk becomes a problem) the entire program will cost more time and when it cost too much extra time the Board of Directors may decide to cancel the program. *Argumentation 6.5 – it is better to schedule two months extra for the program than schedule five months less. When such a major drawback occurs people may*

become frustrated, may lose interest in the program or would be less committed to the program. All these problems can result in the cancellation of the program.

- **No way back (roll-back scenario):** when it has been decided to cancel the program it must be easy to revert to the original state or to a state where all the functionalities of the old situation (before the start of the implementation of this program) are available to the AMC staff. In the latter situation it can be that some of the new applications are installed and have taken over the functionality of the old applications successfully, in the case of these applications it would not be necessary to replace them with the old applications. This is also one of the main incentives to set up these subprojects in the program; to provide a way back and make a huge program like this more feasible and less vulnerable for having a point of no return. **Argumentation 6.6** – *hope for the best, plan for the worst. We never hope that the program would be a failure, but knowing that there is always a way back will reduce the load of the program a little bit and therefore people will stay more committed to the program; they also know that there is a way back. In this program per subproject it is possible to roll-back; the implementation strategy is organized in such a way that it can facilitate roll-back scenario's. An old application is not replaced before the new application has taken over the functionality and the user is capable to use the application.*
- **No commitment:** when people are not committed to the program, the program will fail (especially when the end-users are not committed). End-users have to be involved in the entire program. Subproject managers must be open to receive critics from the end-users. **Argumentation 6.7** – *by organizing meetings, by training of end-users and let them use the online training program and the Model System the end-users are closely concerned in the entire program. At the other hand the old situation is only replaced when the end-users are able to use the applications.*

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APPENDIX A

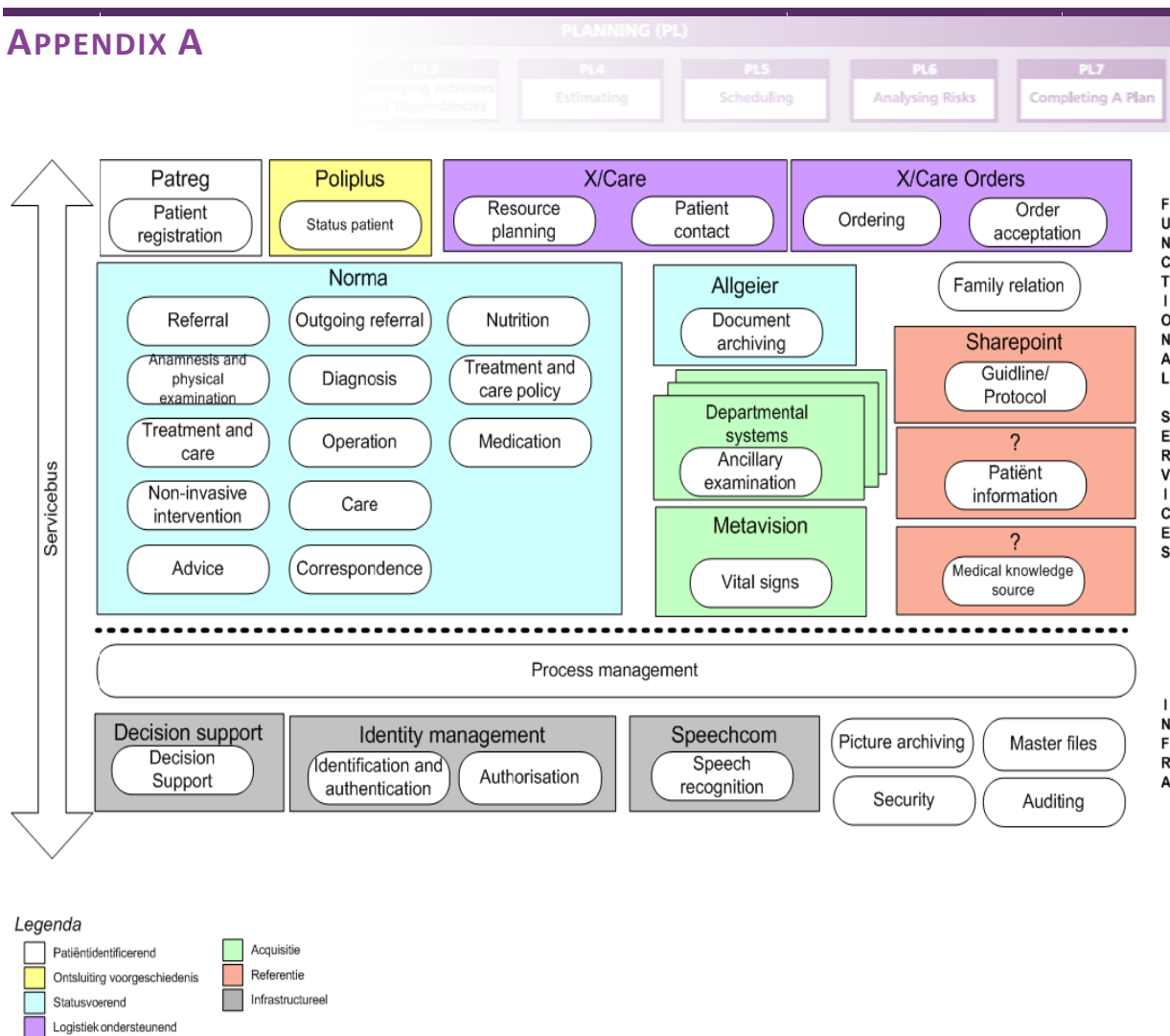


Figure 1 – The overview of several applications of the AMC.

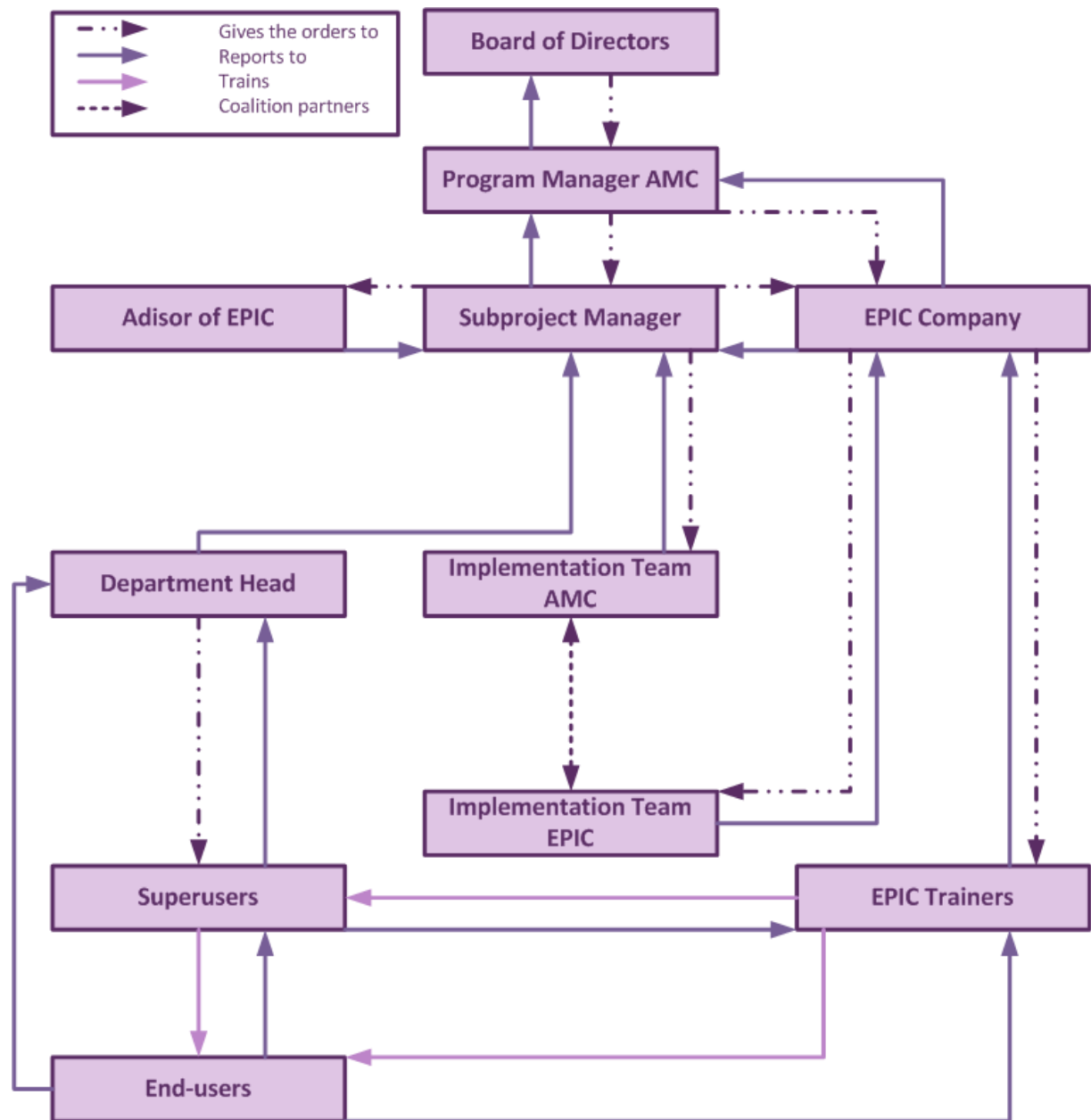


Figure 2 – Decision making during the entire program. Coalition partners means that these partners work closely together (and at the same time) in order to acquire the goals set by a subproject.