SYSTEM PROPOSAL

AN INTEGRATED SYSTEM
FOR BETTER HEALTHCARE SERVICES
IN INDONESIA

INTEGRATE
SYSTEM

ANALYZE
DATA

PERFORM
BETTER SERVICE

The Problems

Data integration is a method to collect data from many different form to build a new knowledge for decision making. The knowledges are crucial because it gives impact in the future. Therefore, the main objective of data integration is providing stakeholder a good decision making for best outcomes in the future.

When we talk about health, health is the most important aspect for us as a human-being. Because of its urgency, information about our body condition is urgently needed, recalling that wrong moves can cause a fatal effect in the future. With the help from data integration method, we can predict the future. If it is not a hundred percent correct, we can assure that it almost perfect because data integration means we cross-check every data inside the system, in this case health care system and it proves that the data is reliable enough to be processed and create a new knowledge. When the system goes, the data, information, and the knowledge are processed all the time and the final goal is to make a kind of personalization for each person about their own health care and the solution regarding the condition they have at the time. Beside for personal concerns, healthiness of the people of a nation is also considered for the quality assessment. The healthier citizens means a good nation to be lived in, the pride of a country is increased and it can cause for a better economy condition, international relationship, etc.

There are a lot of factors are involved in deciding someone's health solution. It comes from the schedule of daily tasks, the activities, the environment, until the food they eat and the liquid they drink every day. Everything is in a system. For example, the containing sugar inside a bottle of tea is different even a slight with another bottles. When a particular tea is consumed by a man with an almost-high sugar blood level, it has to be warned because by the time he finish the tea, their sugar blood level is over limit. But if another tea with a lower sugar level is consumed by the same person, it does not have to be warned urgently. So basically, we need to personalize everything even for foods and drinks or even drugs because everything is different and is distributed differently to different individual. With an interconnected network, we can take some information from one data repository, combine them with information from another repository and try to apply for a particular person and finally gives this person an insight about what is going on inside their body.

Data integration is also applied in aiding people. The weakness of the legacy system is there are no connectivity or communication between hospitals or health care units so the basic activity such as registration is going repeatedly. Every time we move to another hospital or health care unit, the exact same activity must be done to get the services. The useless spent time can be covered by integrating data or basic information about the patients between hospitals and health care units. Beside it reduces the time in entering entries, it reduces the effort in giving health care services. By integrating the data between hospitals and health care units, the history a patient can be tracked so the handling for the current situation can be fast and more informed so more precise. The reduced of time wasted on waiting for registration, the reduced of time wasted in checking patient to find out the disease that has been found by another doctor in another hospital or health care unit, and the minimal risk need to be taken in using drugs, health care services can be done in a faster way and yet create a better handling and it results in an increment of people aided. By integrating all the data and with some helps from information technology, makes the process are a lot easier and produce a better result.

When Internet of Things (IoT) is implemented, there will be a data explosion. The data can be easily integrated with the personal life because internet is embedded in everything around us. By taking the advantages of the IoT implementation, data about personal condition can be analyzed and the person can receive the information immediately. Let's consider an example. By getting an information about the actual heart beats of a person, it can be measured and the result can be given back to the person so the person can prepare things they should do to prevent the heart attack. Or even more, by analyzing the real condition, the activity, sleeping schedule, lunch and dinner menu, a healthcare analyst or an artificial intelligence can give a feedback how to live for a better condition or to prevent the heart attack. Data is important to create a new lifestyle to prevent a kind of disease, or at least to warn people about their actual health condition. Beside analyzing the health condition of a person, IoT can be used to keep the drugs available. By taking information from the doctor analysis, the drugs that is needed and bought, and the drugs availability in the house (assume that IoT is well implemented), whenever the drugs in the house almost run out, the system can immediately order to the nearest or the cheapest for the particular drugs based on the doctor analysis regarding the patient's condition. By automation of anything, there is no such a reason to skip consuming the drug because the drug runs out. The virus is perfectly killed by finishing the drugs. When the drug is consumed half way, the virus is going stronger and less likely to be perfectly removed.

There are some disease which doesn't need to be analyzed by a doctor or specialist so the customer just buy the drug. When all data from pharmacy is integrated and analyze, we can see the trend and the spread of the disease by time and by location. It means that pharmacy can effectively spend their money to the right drug based on the season and decrease the waste. From the pharmacy perspective, the money is spent in the correct things makes a small amount of waste and higher profit. From the customer point of view, because the stock of a particular drug in pharmacy is controlled by the shift of the disease season, the customer can always get the drug they need, every time and everywhere inside the location of the same disease problem. If the information like disease season is implemented for pharmacies, when the urgency comes, there is no more fear because every pharmacy is ready with a reliable stock for enough customers.

Indonesia's geographical often changes and dynamic. It is caused by the natural disaster. When the geographical condition change, the quality of the environment around is also affected whether it is better, or it is worse. The changes of the environment affect the people's quality of life which mean it affects the healthiness in that area. When the environment changes, the habit changes as well so does the most ideal life plan to be healthy need to be changed as well. By connecting the information about the geographical data, it can be the surfaces, the rain intensity, the quality of the water, the ideal life plan can be reworked. By creating a new habit with a new environment means a new healthy life plan need to be produced. If all these data are not integrated with the people's habit, the ideal life can't be dynamic whereas the ideal life plan is not same anywhere. Recall that majority of these areas are not well-covered by health care unit hence, to keep the people healthy over there, it needs to use a prevention strategy which is giving a healthy life plan through geographical analysis and create more precise moves for them before the healthcare unit can penetrate the area. When a health care unit wants to penetrate the area, it must be perfectly planned because the construction can be crucial. By analyzing all the data taken from sources, health care unit provider can decide the most efficient place for the first health care unit that can cover all the location.

Thinking about healthcare, it is still attached with financial problem. It is a fact that we need money to make everything works. It needs a cash flow within the system. We know that health is not a cheap thing. It costs a lot of money for sure. The question is how people with low financial can afford these services? In Indonesia the healthcare services are subsidized. Consider the government's expenses, it costs a lot of money if government must subsidize everyone. The solution is to subsidize person by person differently based on their financial condition. For a man works it is not possible and takes a lot of effort, but it is a different story if we use a kind of algorithm to allocate the subsidy to the right individual with the perfect amount. By combining the money spent in the supermarket and moreover, what the money is spent for, the monthly income, and the daily occupation, government can allocate the money fairly. It is important for government to manage their money for another concerns. By connecting all the data include the bank or credit card, financial technology can be applied. It can be a cashless system so everything it takes to use the healthcare services can be automatically computed behind the scene by the computers hence the first thing can be first which is the handle of the disease. There are a lot of cases which people died because they did not have money to pay the healthcare services hence no services. Even if a person doesn't have money right now, by forecasting this person's business or occupation, the money from the government, the type of services can be given which fit with the financial strength of the person.

With the growth of population, experts cannot handle every problem that the citizens have. It has to automated to cover all the problem that the citizens have. Starts from analyze based on the symptoms. When the symptoms of a disease have discovered by experts or doctors and has been confirmed, it must be added in the database, so the artificial intelligence can analyze the symptoms and decided the disease of the patient. By matching the patient's symptoms and the disease's symptoms in database, the type of disease can be found faster, reliable and accurate so the taken action can be accurate.

Data integration for healthcare solution brings up a new issue which is privacy and security. When implementing this method to solve problems which lie in our daily live, security must be strong and maintained. About the privacy, I would more prefer to say that first thing first. People more concern about these health problems more than privacy issue so for this short period, so basically, we can fix the system first by integrating all the data, then we just rethink about the privacy. But we still give choices for people who wants to join in the system but don't want to show the financial things. It also means that they do not get subsidy because the subsidy system is based on income and expenses. When everything is connected to internet, we need to accept this reality before we embrace the changes that there is no more privacy. everything can be connected remotely from anywhere as long the devices are connected to the internet. Moreover, when data integration is implemented. On the one side, we can forecast things like heart attack possibility or even deaths, but on the other hand, the industry who using the big data, knows everything.

Health is the most important thing and people will consider everything to get the information about their current condition, so the correct reaction can be taken on behalf of their healthiness. By providing them with an easy-to-use application which contain current condition, the best solution for possible emergency condition, and the ideal lifestyle based on each person daily activities including what they eat and drink. Providing this information, we will increase the life quality for

each person personally. If every person's life healthier, it means the quality of the nation is better and it affects all aspect starts from economy, international relation, etc.

The Others

1. In Singapore, since 2011, they have prepared a national database for healthcare system. The database is centralized which is managed by the government on behalf of a better healthcare unit system. But there was a problem before it was finally fully implemented that people are more likely not to go to hospital but to the traditional doctors where these kinds of business has their own repository or even worse, they have no digital system hence, the medical information about the patient cannot be gotten. They combine medical record from every healthcare stakeholders such as hospitals, pharmacies, and polyclinics to serve a better, faster, more accurate healthcare services. Another problem is because there are a lot of elderly doctor who are not familiar and does not want to change to use the system. But they are not stopping there, they force every healthcare unit to use the system.

2. In France, they use data integration for rare disease purposes, but they also use for administrative of patient's medical report purpose as well. The database is constructed by the healthcare units and doctor with a specific expertise of disease. Their daily task is more likely an administrative task such as input patient's data or medical report and images that correlated with the patient. Every system was going on its own at the first place before they finally decided to avoid the duplicate entries from the expert by using data integration.

3. In United States of America, data integration is used for healthcare payers. When the institution shifts from contract-oriented into patient-oriented, the needs of data is increasing. They qualify almost every part in the claiming process. Start from the prevention effort until the claiming process, they are data-driven. They are using data to build a personalization, they build profiles for customer and anything related to them such as their preferences and personal life and activities. By using a wide data source, the healthcare payers can decide the market and customer target. By profiling through the customer's personal life, the payers can give the solution for the customer about how to live safely and healthy.

4. In Canada, data integration for healthcare service is used for internal system in healthcare services provider such as hospitals, polyclinics. The system is provided by SAS with the main idea to make the analyst works efficiently on behalf of customer satisfaction. The data integration for healthcare provider allows the data consolidation between local healthcare units and to automate the information reporting from multiple system and repository and the data is shared back to the healthcare providers to give a better service. Besides that, this system helps the healthcare service providers to perform root cause analysis so fix the service, perform improvement in performance, report, and accountability, controlling staff, etc.

The Strategy

Talking about data integration, things that we urgently need is data. Therefore, we need every stakeholder that is in charge in the system to use online database and fix the database on behalf of reliable data. When we talk about decision making, we need some reliable data to be processed so the information could be accurate. Moreover, when we talk in terms of healthcare which is directly correlated to someone's life. Wrong decision can cause some fatal excuses including death and the trust from citizens is gone forever. It is important to keep the trust hence the project can reach the goal. When we finally decide that we want to increase the health quality, the competition between stakeholder in the system is not about the data anymore but more about the services, speed, and the experts they have. The big data need data from those repositories, so basically the data need to be opened.

There are a lot of offline stores and offline healthcare unit running their business. We need their data hence we need a kind of digitalization to their system so the data inside the business can be stored and we can gather them. The actual system can be built by hiring a lot of national's programmer. Developing a big ERP can be effective by hiring programmers under one lead. When we develop a system with one direction, the system will be more stable and more reliable. After the system is finished and tested, we need to implement them, so the activity of this primitive business can be tracked. We need to keep in mind that this is a radical transformation, it will be treated as a threat. The communication plays the most important role in supporting the implementation process. If the concept, the vision, the goals are delivered well to the stakeholders, the implementation could be done easily but it would be almost impossible otherwise. To make the implementation process even easier, the system can be given by free because basically to implement a data integration, we need data from them to be analyzed. Giving some prices is another good way because we also give them a lot of benefits like a targeted market and simpler process to order their needs (i.e. drug needs for pharmacy) but some of them will refuse because of a classic reason, they don't have the money. Assuming the process is well-accepted, most of the business that is involved in providing healthcare services are now in the integrated system. At this step, whenever the stakeholders do a transaction (pharmacy sells drugs, healthcare unit handles patients), the data about that transaction are starting to be gathered and analyzed.

After we cover the primitive and immature business, we need data from the mature one as well. To get the data from stakeholders with a mature system, we need an API. It can be done by sending our programmer to code the API based on what language they are using or if they have their own programmer, it can be done as well. Building an API is a mandatory step to make everything easier and faster. By implementing API, the stakeholders do not need to change any code within the system in order to open the access to the repository. The API that has been implemented, can be called by our application and the results are gathered inside the big data. As an exchange for the gathered data, the stakeholders can use the result of these data analysis for their own good and to increase the service quality. By using the result from the analysis, many good decisions these stakeholders can make because the data provided is wider and more mature. At this stage, we have gathered data from mature and immature stakeholders.

One of the unique constraints for Indonesia is its geographical condition. The differences of condition between these geolocations create some differences in lifestyle and most likely the way to approach an ideal healthy life is different as well. Therefore, the details of every location is

needed in order to achieve an accurate solution for people to live healthy in a particular environment. By using the data from geographic information system that has been implemented so far to analyze the condition of the soil, temperature, height, etc. combined with the data from daily schedule of the people around there, experts can decide, create, and socialize it to people on that area meanwhile the infrastructure such as internet and the healthcare units are built. When the infrastructure such as internet has been implemented, the internet of thing method can be applied. We are talking in the context of a village level where the electricity and internet connection is not stable. Because of that, we cannot do the personalization before the internet of things is applied. But, even though we cannot do the personalization, we can still give them the best solution for the ideal life using their geographical condition data (including the resources for food) and their daily activities in general. From such a data like them, a solution for their better life can be produced and socialized to people out there.

For the first few years, the implementation and the development of the infrastructure need to be penetrated throughout the unreachable places. By the time the development goes, the Information System need to be implemented step by step hence, the new infrastructure still can be controlled and monitored. At least, each city has the infrastructure for the citizens to go to when they need any type of healthcare service. When the penetration keeps being done to another unreachable places, another infrastructure such as hospitals, pharmacies, healthcare units can start their business process so the data collection and analysis starts as soon as the infrastructure ready. While the penetration is still going and spreading, the big cities can implement internet of things, because the connectivity in big cities are more reliable. By integrating all of the daily activities data through all devices around the subject, the solution, suggestion can be given immediately. When the internet of things method is applied, the real data integration has begun because with the help from internet of things method, everything around us can give more impacts on the analysis and make the decision even mature.

In building an integrated system with integrated data, we cannot solely focus on the integration of the system. We need to give attentions to the human factor as well. There will be a shifting phenomenon where doctors may not be meeting with the patient in order to analyze patient. Because of the significant growth of population, the experts cannot handle the patient one by one and it causes an uneven quality of life between regions. To solve the problem, we need assistance from technology and its (the technology) knowledge must be inputted by a healthcare expert, so the AI knowledge for the region without healthcare experts can get the same result or if it is possible, get the better result. In addition, because when the data is integrated, which mean we have a new a kind of brain, a super brain that contains data about anything related to health. So, we can shift the trend where the experts can retire from being a face-to-face doctor and become the expert who does researches to expand this super brain, and the younger can handle a bigger case with the assistance from the super brain, so they can solve the problem that they have not faced before. We have to admit that most of the people in Indonesia do not have the sufficient money to have a specialist education hence, Indonesia are insufficient of experts to handle difficult cases. By implementing this big data, doctors who cannot take the next step of learning, can use the information from this new brain, the one who has the resource can take the specialist and at the end of the line, the specialist become the researcher and the not specialist, keep being the face-to-face doctor. Government can give a lot of scholarship for health and technology major. Simply because when implementing big data about healthcare, these two majors does the hardest part. By giving them scholarship with a contract, we can send them to the fresh-penetrated region and they

monitor the actual condition so the we know what our step is. With this super brain assistance, we can give an equal services and knowledge to the places outside these big cities hence, Indonesia can have an equal or at least the standard of the health quality can be upgraded.

Year	Activity
First 5-10 years	-Infrastructure penetration to all places in Indonesia
	-Education for developers, doctors, and the other healthcare job by providing scholarships
	-Implementing IoT in big cities
	-Developing the ERP & the APIs to integrate the system
	-Developing the interface for mobile for customer for some view years
Next 5-10 years	-Implementing the system to the offline business
	-Gathering and analyzing data from the fresh system and from the API, also from the GIS
	-Keep penetrating to rimland, improve the actual infrastructure
	-Keep trying to implement the IoT
	-At the end of these period, when the data is gathered nicely, launch the mobile application
	-Keep giving education for developers, doctors, and the other healthcare job
Next 5-10 years	-The specialist doctor shifts to researcher but not all, few of them, start implement the AI in healthcare services
	-Experts start to give solution and ideal life plan per region
	-At the end of this period, data that AI needs to create an ideal life for each person is enough. This feature starts to be implemented.

The Hopes

With all the problems that have been analyzed and the solutions have been planned, we hope that Indonesia's healthcare service can be improved and create a better environment. We believe that a good environment is good for everything most importantly to live. With automation using the system, we hope that even if one day, there is no more doctors, or even when something bad happens like natural disaster, people can live in the way they should be, which is the most ideal life in the situation. With an integrated system, an integrated dataset, the smart artificial intelligence, we hope that Indonesia's citizens life quality be mature by themselves even without any involvement of human.

Best Regards,
Beginner.