ISEN 665 :- Management of Engineering Systems

Project Report for

Decomposition and Evaluation of Enterprise Group at Lockheed Martin Corporation

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INDEX

1. Executive Summary

Problem Statement

In recent times, Mr. Brent Lyon who is a Senior Industrial Engineering Manager at Lockheed Martin Corporation identified the need to analyse and evaluate his team. The need was experienced after he took over the charge of the operations team and included it in his group which is known as 'Enterprise Group'. The enterprise group also looks forward to use Machine Learning and Data Science proficiently in their daily operations. Mr. Lyon also feels that he is not able to utilize all the talent available at his disposal.

Proposed Solution

The Enterprise group will undergo restructuring to ensure that the information flow is uniform and utilization of the available talent is done properly. The Enterprise group will also add a new team i.e. The Tech Team which will implement ML/DS techniques in the daily operations of the group. The plan is to slowly and steadily increase the use of new technologies to help the enterprise the group deliver better solutions to its customers. The proposed solutions can be divided as

- Technology Implementation Thrust
- Improved Communication Thrust
- Engineering Management Support Thrust

Value

With implementation of new technologies like ML & DS, Enterprise Group will be able to solve the customer problems with availability of right data for decision making. It will also ensure that the Group has enough of data to put forward a strong reasoning to their solution and validate many of their solutions before implementation and investing money on the project. The Communication improvement will ensure that the investment done on the enterprise group has a high return. Also, it will add value not only to the group but the whole F35 unit and in larger aspect to the Lockheed Martin Corporation. In long term Enterprise group might increase by 100% of its current capacity and still get more return on investment percentage compare to current scenario.

Final Thoughts & Next Steps

All this thrust areas are the areas of continuous improvement and it is difficult to obtain 100 % optimal solution for the problem but the solution can be described as satisficing and new goals can be introduced after each milestone is achieved. This project is self-evolving and there would be some diagnosis at every stage when we start implementing the project

2. Introduction

The enterprise department has been a helping hand to various problems that many other departments in the Lockheed Martin corporation. With time, The Enterprise group is looking to come up with new technological implementation in their work to reduce the workload on the engineers for data collection and processing. This will help the group to monitor the process over the years and get long sets of data which will be a huge factor in decision making and will ensure that the decision is not biased. With time, the group looks forward to increasing the use of ML/AI in more of their projects. The priority of this implementation is to get going with the use of Machine learning and similar technologies in the daily operations. The team is however concerned if they have the right resources now with them to implement the concept. The purpose of this Project is to engage in development of support activities within the overall implementation of the new culture of data driven problem solving. The Institutionalization of Machine Learning and Artificial Intelligence team is an upcoming operation for the Enterprise group at Lockheed Martin Corporation. This will not only affect the enterprise group but also the other departments who work with the group on a regular basis. It is therefore of the utmost importance that a coherent system engineering approach and focus be created early and be maintained throughout the life cycle of the operation.

3. Discussion of the Nature of Problem or Opportunity

There are two major root causes of the current pursuit, one is the need to implement new technology available that can increase customer value and stay competent in the era of industry 4.0. And the other is the optimum utilization of all resources and team members under Mr. Lyon's leadership.

The vision statement of Lockheed Martin states the aim to be a global leader in advancing scientific discovery and delivery innovative solutions to their customers. Thus, in line with this ideology, Mr. Lyon plans to implement new technology such as artificial intelligence. The current team has the talent and resources they require for this task, in addition to further assistance available from within the organization. The team encounters projects and issues daily that can be modelled or solved better with the use of available data, such that these models can be used in future when a similar problem arises.

Mr. Lyon's team would expand his group with the new technological advancements and team additions in his group. Mission, vision, and values need to be established and maintained consistently across the group. Optimum utilization of the resources and talent is of at most importance to his group. Thus, process reengineering, and redirecting is to explore the untapped potential across teams. Thus, the problem statement is formed wherein a plan to implement new technology is required and some level of process reengineering may follow which can redirect some roles and teams.

4. Needs Analysis and Requirement Definition

'Needs' or customer requirements

These are the 'what's of the task at hand and describe what is required of the deliverables from customer's perspective. The 'customer' term used here also includes the internal stakeholders in the organization who will directly benefit from the technological implementation and the external customers who will benefit in value generated from a better quality and advanced feature product.

The system shall:

- Attenuate variety in processes in order to preserve consistency and quality in the product.
- Accommodate specialized customer demands and specifications.
- Be lean and cost-effective to avail the customer maximum value for investment.
- Accurately depict customer preferences using data-driven insights.
- Securely store customer data and protect their privacy at utmost priority.
- Provide customer with an innovative feature that adds value to their endeavour

Program/Project requirements

These are the program technical requirements, the ‘what’s from the customer needs are converted into ‘how’s as it lists what is required from the system to satisfy the customer needs. The system shall:

- Streamline business processes to effectively implement and transfer insights from artificial intelligence,
- Allocate and assign roles and responsibilities to explore full potential of human resources available.
- Identify target areas in the business processes to implement artificial intelligence,
- Utilize the available technological resources and data infrastructure to maximum potential
- Consist of mechanism to automatically check compliance at every stage
- Implement new leads from research in a continuous improvement feedback loop
- Be provided with adequate investment in terms of data collection and subject matter expertise
- Designed to facilitate exploration of new deep learning tools and help the data scientists update their skills in accordance to industry trends.

5. Technical Objectives

There are a variety of Technical Objectives that are identified under this project and available resources. The Report guides to the initiatives required for successful achievement of the technical objectives.

1. Maximize satisfaction of team members
2. Create a level ground for all team members to work and share ideas
3. Improve cross functional working efficiency
4. Identify target areas for implementation
5. Effective utilization of team member capabilities
6. Effectively communicate the company’s mission vision and values
7. Redefine roles and responsibilities for team members
8. Implement Data driven decision making
9. Build data architecture for ML/DS Implementation
10. Explore new deep learning tools, certifications
11. Increase Return on investment
12. Increase Customer satisfaction

6. Core Design Artifacts

The institutionalization required to address the technical objectives is achieved by using various design artifacts such as;

6.1 Strategy Map and Balance Scorecard

A strategy map is a simple graphic that shows a logical, cause-and-effect connection between strategic objectives. It is one of the most powerful elements in the balanced scorecard methodology, as it is used to quickly communicate how value is created by the organization.

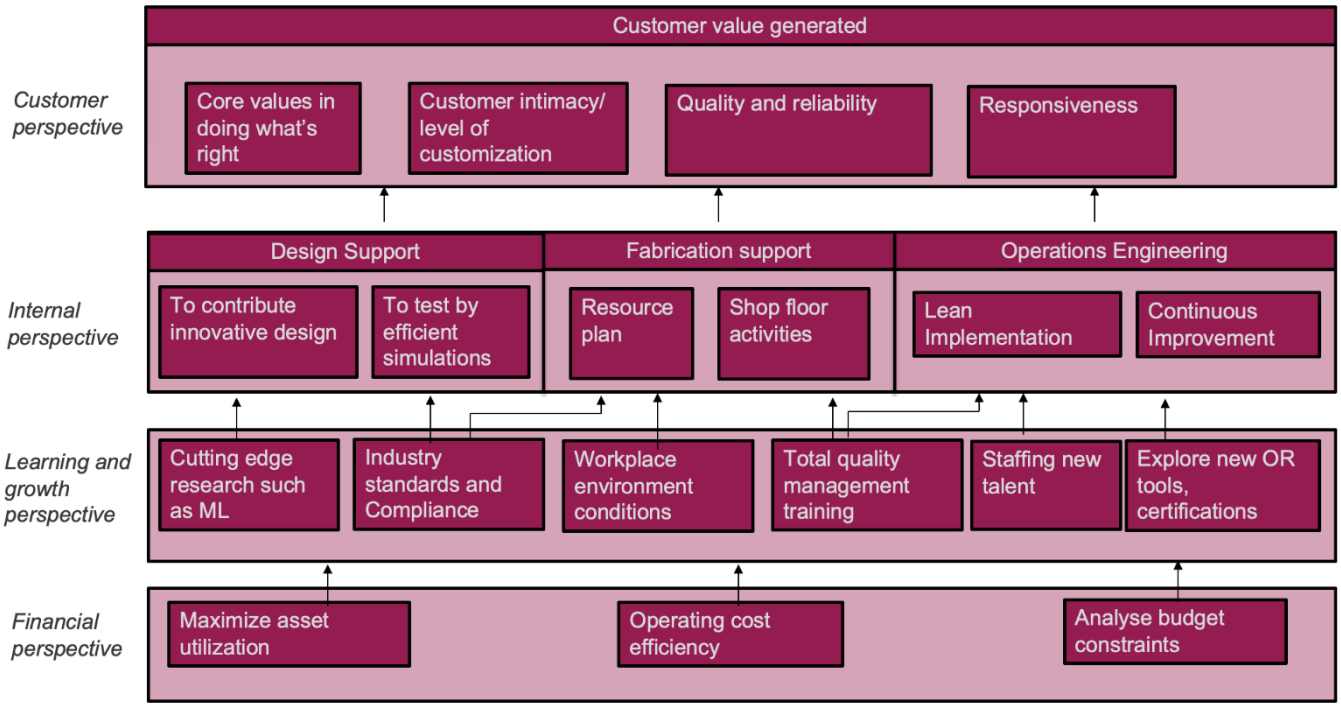
- **Mission -** We solve complex challenges, advance scientific discovery and deliver innovative solutions to help our customers keep people safe..
- **Vision -** Be the global leader in supporting our customers' missions, strengthening security and advancing scientific discovery.
- **Values –**

i. Do What's Right

ii. Respect Others

iii. Perform With Excellence

6.1.1. AS-IS MODEL



Theme: Technological Advancement			
Strategy Map		Balanced Scorecard	Action Plan
Perspective	Strategic Objectives	Performance Measures	Initiatives
Customer Perspective	• Data driven decision making • Customer intimacy/ level of customization • Variety engineering, quality • Innovation	• Customer satisfaction measures through surveys, competition study • Level of data driven decision making • Quality measures in variation, six sigma levels.	• Implement the new technology such as artificial intelligence
Internal Perspective	• Identify target areas for implementation • Build data architecture • Data governance • Risk tolerance	• Target areas where artificial intelligence or data driven decision making is applied. • Tools and facilities contributing to capacity • Risk analysis	• Build or procure infrastructure required
Learning And Growth Perspective	• Cutting edge research • Confidentiality and Compliance mechanisms • Adequate data investment • Explore new deep learning tools, certifications	• Number of employees trained or promoted in-house. • Compliance ratings • Number of new deep learning, AI tools explored	• Train and close skills gap in human resources
Financial Perspective	• Return on investment analysis • Reduction in risk • Customer satisfaction	• ROI, PP, etc. • Quantitative risk analysis	• Cost-benefit analysis

FIG. Technology Implementation Strategy Map & Balance Score Card

6.1.3. Improved Communication Thrust

Theme: Communication Improvement			
Strategy Map		Balanced Scorecard	Action Plan
Perspective	Strategic Objectives	Performance Measures	Initiatives
Customer Perspective	• Maximize satisfaction of team members • Create a level ground for all team members to work and share ideas	• Get to know the strengths and interests of employees • Allow newer employees to give internal presentations and timeline	Analyze team structure
Internal Perspective	• Improved cross functional working efficiency • Effective utilization of team member capabilities	• Conduct weekly meetings with pre-set goals and agenda • Track goal progression • Celebrate milestones and achievements • Give shoutouts for excellency	Improve cross-functional knowledge sharing
Learning And Growth Perspective	• Provide opportunity for feedback • Effectively communicate the company's mission vision and values	• Organize weekly happy hours • Conduct one on one interactions with employees	Conduct team building workshops
Financial Perspective	• Increased efficiency and teamwork • Reduce redundancy	• Employee performance	Employee skill profiling

FIG. Improved Communication Strategy Map & Balance Score Card

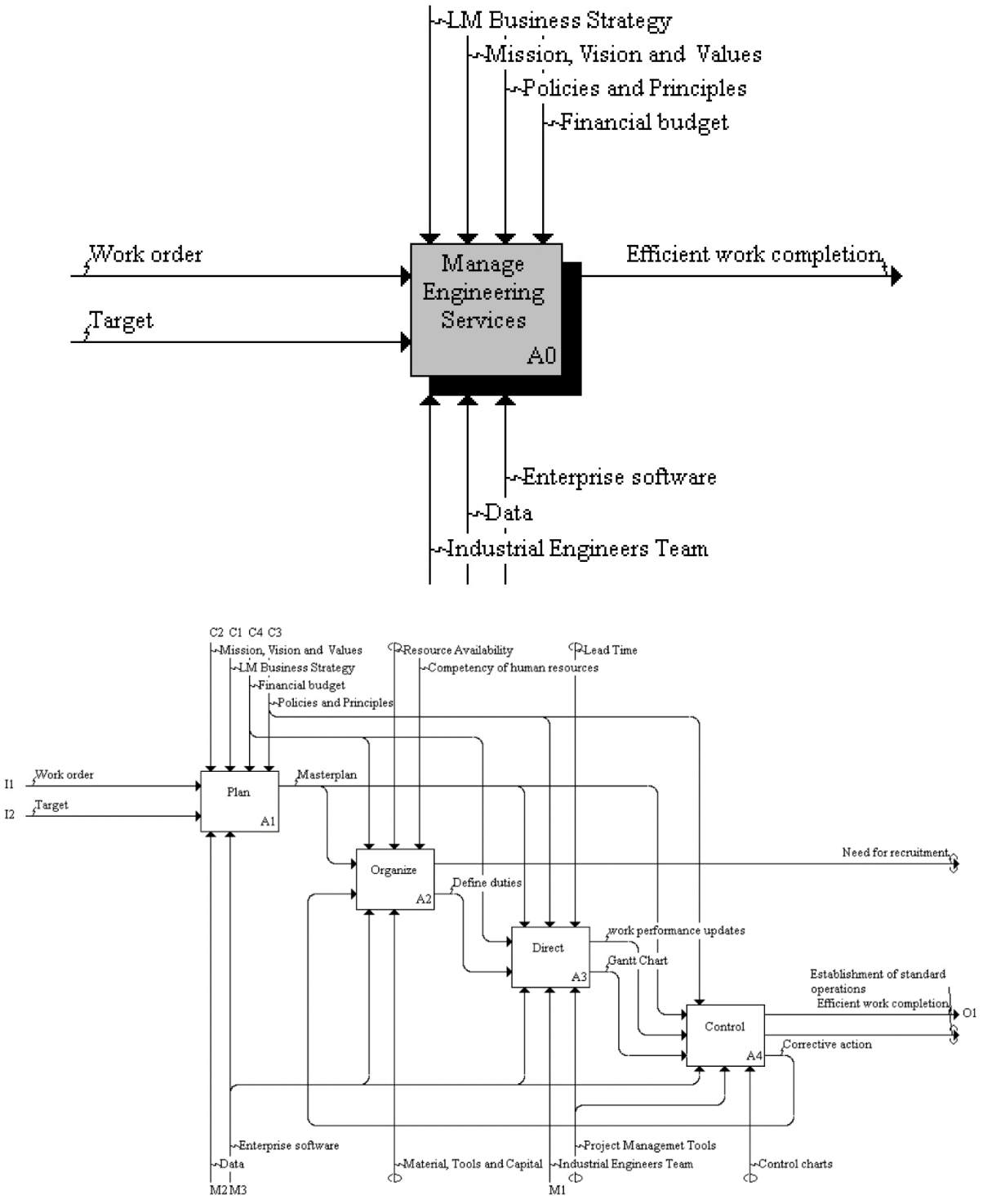
6.1.4. Engineering Management Support Thrust

Theme: Operational Excellence			
Strategy Map		Balanced Scorecard	Action Plan
Perspective	Strategic Objectives	Performance Measures	Initiatives
Customer Perspective	• Maximize utilization of team members • Add/ Retain team members with proper skillset	• Number of projects the team is working on. • Ease of completing tasks without external help • Number of inputs from personnel located in the lower part of chain	Restructure teams
Internal Perspective	• Redefining roles and responsibilities for team members • Restructuring teams based on skill set and past experiences	• Track goal progression • Friendly competition between sub-teams/ members to earn perks • Time taken to arrive at a solution for the problem	Analyze skill sets and experiences of team members
Learning And Growth Perspective	• Brainstorming sessions for effective solutions • Better Inter-team communications • Effectively communicate the company's mission vision and values	• Organize weekly inter team meetings • Evaluate personal growth of employees • Conduct one on one interactions with employees	Initiate creative and friendly work culture
Financial Perspective	• Increased efficiency and teamwork • Maximize the return on investments on team activities	• Employee performance • Teams contribution to F-35 project	Employee Engagement

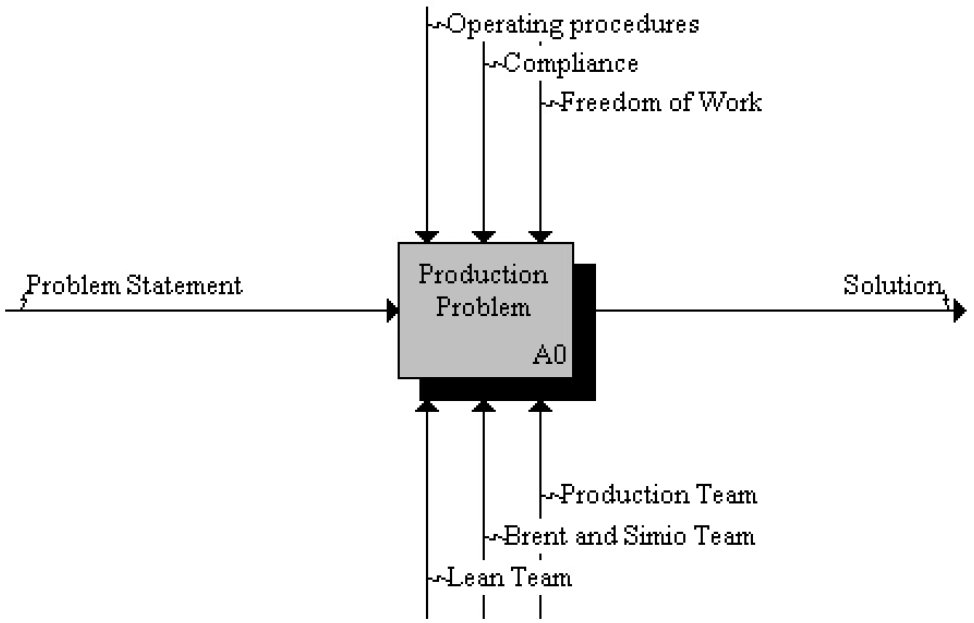
FIG. Engineering Management Support Strategy Map & Balance Score Card

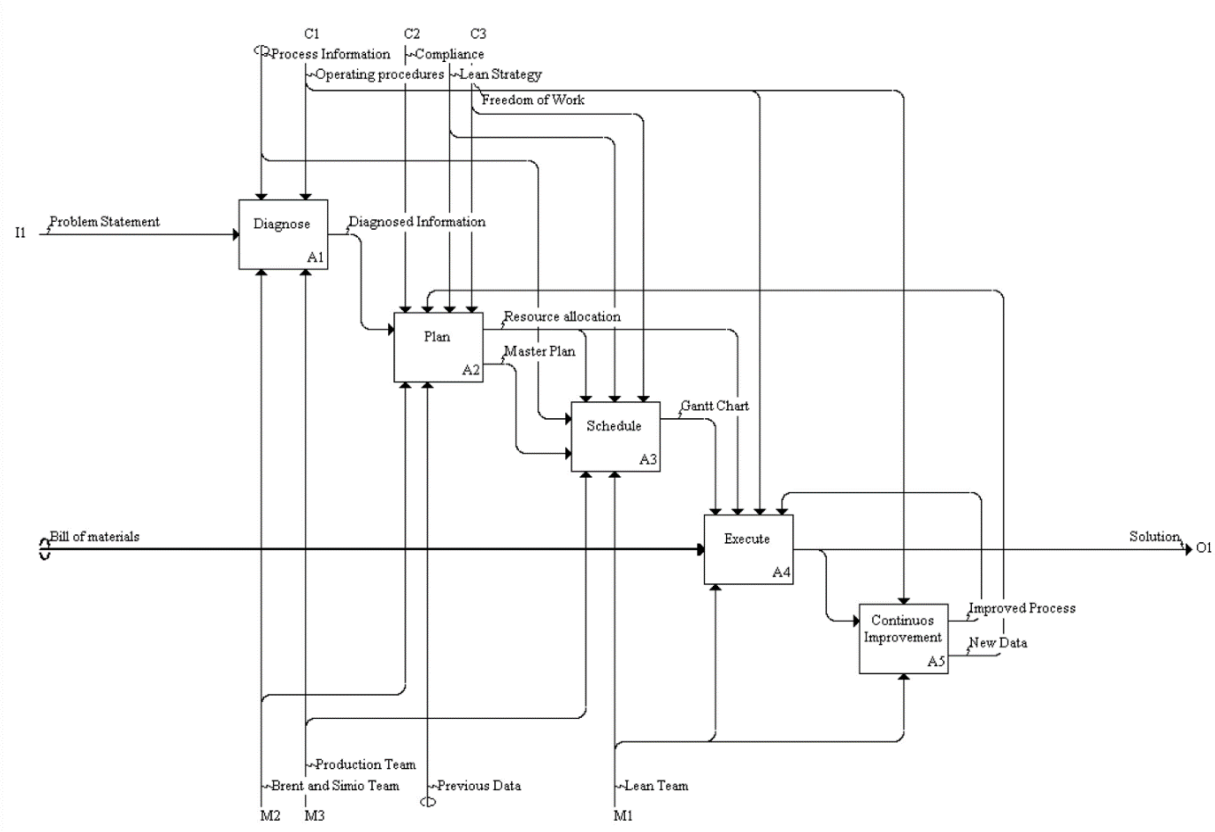
6.2 CONCEPT OF OPERATIONS (IDEF0)

A concept of operations (abbreviated CONOPS) is a document describing the characteristics of a proposed system from the viewpoint of an individual who will use that system. Examples include business requirements specification or stakeholder requirements specification. CONOPS is used to communicate the quantitative and qualitative system characteristics to all stakeholders .CONOPS are widely used in the military, governmental services and other fields.



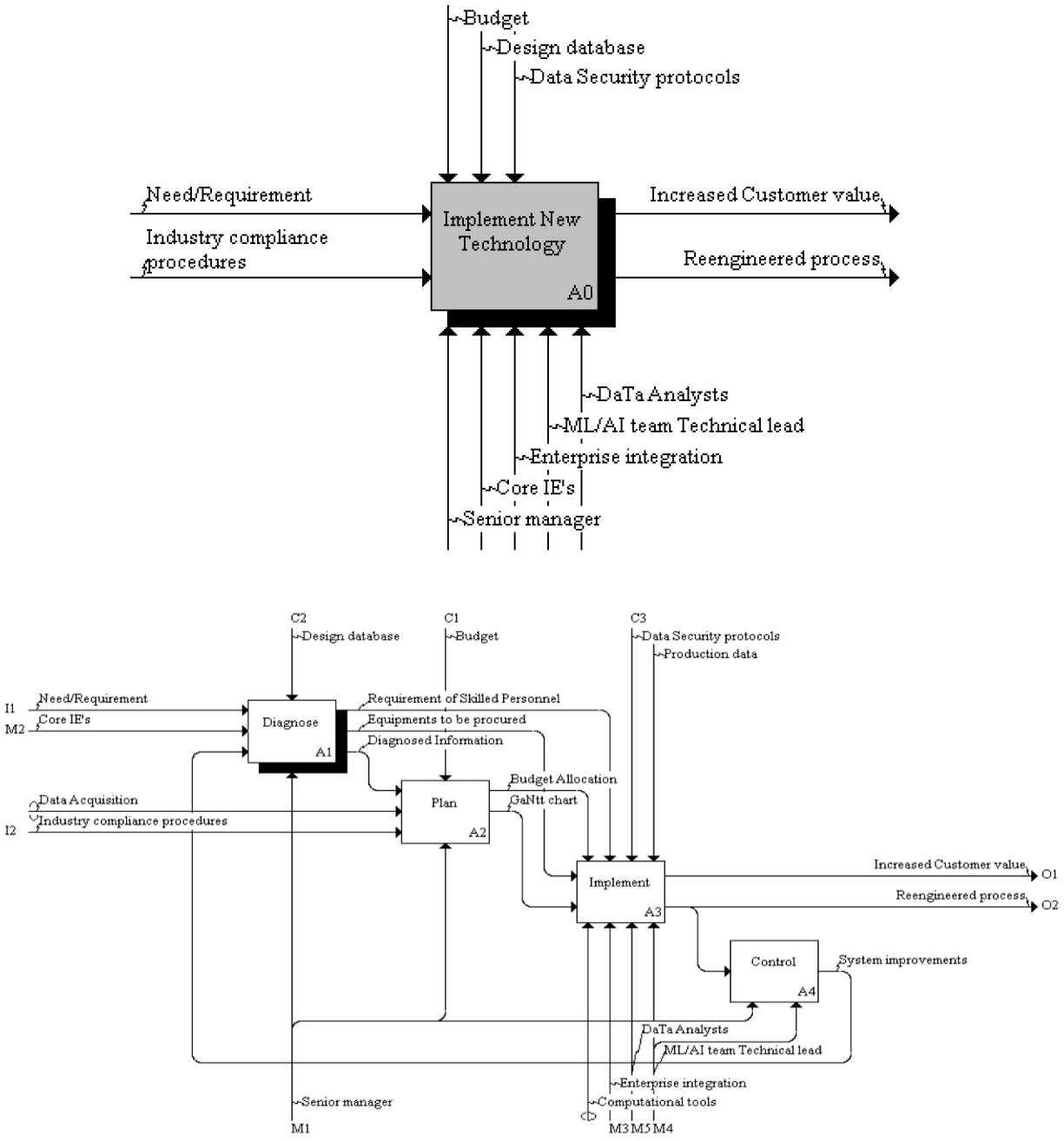
IDEF0-Management Functions in reference to Mr. Lyon

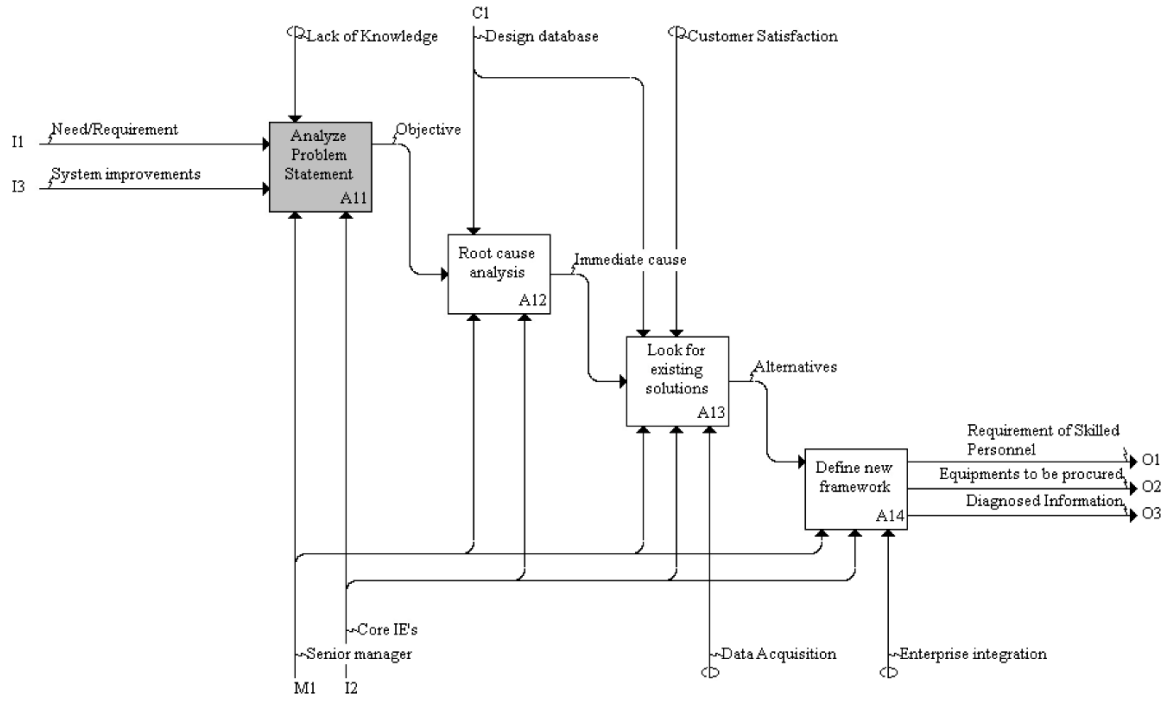




IDEF0- PRODUCTION PROCESS

IDEF0- Implement New Technology





Decomposed IDEF0 for Diagnosis A1

6.3 System Engineering Management Plan

A Systems Engineering Management Plan (SEMP) is a document that addresses a contractor's overall systems engineering management approach. It provides unique insight into the application of a contractor's standards, capability models, configuration management, and toolsets to their organization.

6.3.1 Purpose

The purpose of this System Engineering Management Plan (SEMP) is to engage in development of support activities within the overall implementation of the new culture of data driven problem solving. The Institutionalization of Machine Learning and Artificial Intelligence team is an upcoming operation for the Enterprise group at Lockheed Martin Corporation. This will not only affect the enterprise group but also the other departments who work with the group on regular basis. It is therefore of the utmost importance that a coherent system engineering approach and focus be created early and be maintained throughout the life cycle of the operation.

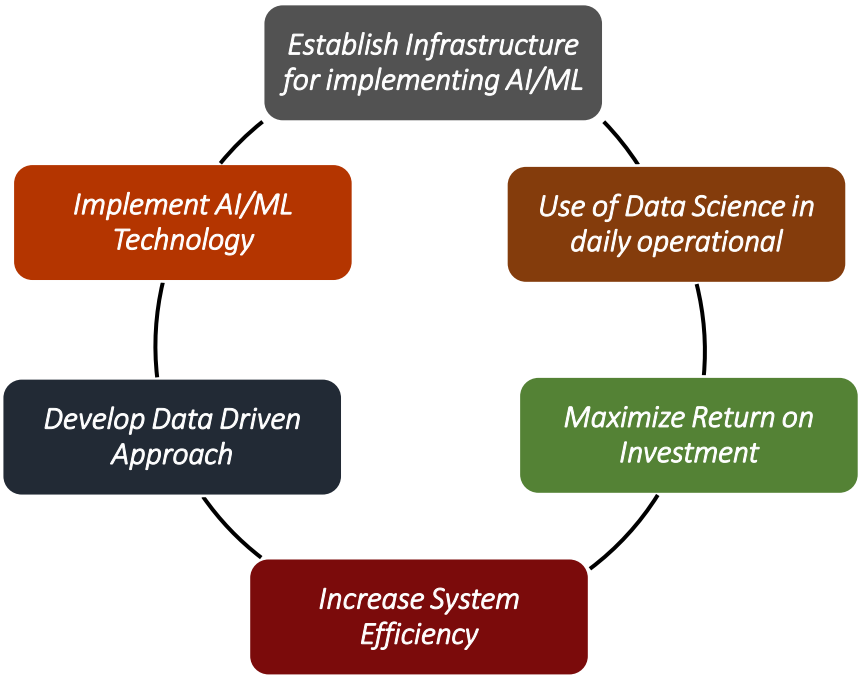
6.3.2 Scope

This System Engineering Management Plan (SEMP) will describe the approach, activities, products, processes, tools, and controls that will be used during the relevant phases of the development of the new team to support and ensure the successful implementation of the new Machine Learning and Artificial Intelligence team. This SEMP is a living document and will be updated at regular intervals to reflect changes and progress.

6.3.3 Technical Summary

The enterprise department has been a helping hand to various problems that many other departments in the Lockheed Martin corporation. With time, The Enterprise group is looking to come up with new technological implementation in their work to reduce the workload on the engineers for data collection and processing. This will help the group to monitor the process over the years and get long sets of data which will be a huge factor in decision making and will ensure that the decision is not biased. With time, the group looks forward to increasing the use of ML/AI in more of their projects. The priority of this implementation is to get going with the use of Machine learning and similar technologies in the daily operations. The team is however concerned if they have the right resources now with them to implement the concept.

6.3.3.1 Technical Objectives



6.3.3.2 System Description

The reason behind the creation of this new team is to make the enterprise group equipped with the ML/AI tools and help it solve the issues/problems faced by their customers in a faster and effective way. By the end of successful implementation of this operation the enterprise group will end up adding a new subset which would be known as the "Data Analytics Team". It would consist of a few personnel who are highly skilled in the field of machine learning, data science, artificial intelligence, and analytics in addition to the current Simio, Operations and Support teams working under the Enterprise Group. The enterprise group is also related to many other departments which will mean that implementing this project will eventually lead in helping other departments.

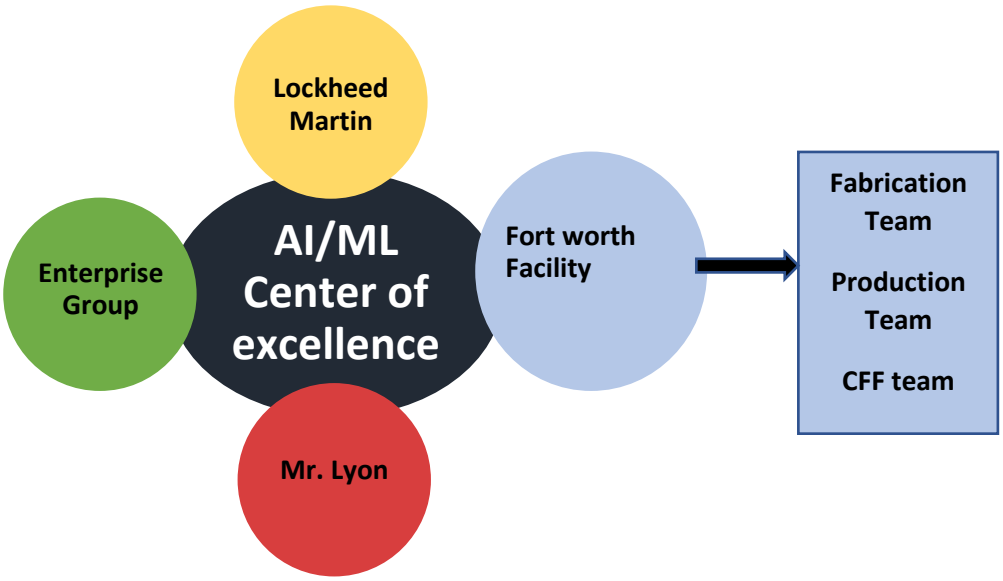
6.3.3.3 System Structure

Key system development stages involved in integrating a new specialized team into the existing structure:

Phase 1: Assess Needs and Preliminary Concept Exploration

- *To find the needs and requirements for the integration/ conceiving of new predictive analytics team*
- *To recognize the existing way of carrying out tasks and finding the operational gaps and needs*
- *Identification of potential stakeholders and beneficiaries of proposed concept.*
- Output:

1. Predictive analysis can save lot of time and effort by utilizing the available data and past results to obtain solutions or to verify the solutions obtained using analytical approaches.
2. The current era is moving towards AI revolution in the anticipation of the very promising results there are. Lockheed Martin and the Industrial Engineering team can make full use of the latest technology and improve on the already efficient team.
3. Gaps in the current methods include, repeated resolving of solutions otherwise obtained from past results, lots of data generated readily from simulations and running equipment daily which when dealt in a proper manner can result in new and amazing results.
4. Stakeholders for proposed concept are identified as:
    - Lockheed Martin
    - Enterprise Group
    - F-35 Production facility at Fortworth
    - Fabrication team
    - CFF team
    - Mr. Lyon



Phase 2: Define and Prepare the Project

- *This phase includes activities aimed at engaging stakeholder participation*
- *Identify the core resources available and ways to utilize*
- Output:

1. The resources available currently:
    - Core Industrial Engineers team working currently on ML and AI
    - Data Scientists from Enterprise Integration team
    - New recruits to the team specialized in Data Science
    - IT team for data sourcing and collection

2. The team can run a pilot project of implementing an ML based solution on a mainframe issue using the data scientists available from Enterprise integration team, interested team members can participate to get involved.
3. Motivated team members must be provided with training opportunities from various resources available, attending conferences while getting trained at new skills.
4. Meanwhile a Technical Manager, a specialized data scientist either recruited from inhouse Enterprise Integration team or a newly hired member must be appointed to take control of the newly formed ML/AI team.

Phase 3: Define and build the solutions

- *Definition of detailed management scenarios indicating how the system is to respond to identified incidents and events*
- *Detailed design documents for software and hardware components to be developed*
- *Developed software and hardware components*

- *Organizational elements and work processes to support system operations*
- *Control measures to be implemented*
- *Gauge the progress with regular end phase meeting and support documents*
- Output:

1. *Required software capabilities such as programming languages and libraries, interfacing skills for languages and corresponding hardware and database management facilities.*
2. *Required resources and permissions to seek help and information from other teams*
3. *Control measures in place with defined metrics to check the progress*

Phase 4: Evaluating the solution

- *Evaluating the operational benefits provided by the deployed concept to Enterprise team or the Fort Worth LM facility.*
- *Final inclusion of the ML/AI team with core technical manager devoted to predictive analysis with his own team of data driven engineers.*
- *Calculating the overall benefits and number of cases solved efficiently and number of man hours saved due to the deployment of the new technology.*
- Output:

1. Efficient sub team to the enterprise group.
2. Evaluation results.
3. Cost analysis and forecasting of future demand increase due to the concept.
4. Lessons learned and best practices.

6.3.3.4 Planning Context

This section contains the programmatic constraints that affect the planning and implementation of the common processes to be applied in performing the technical effort.

- ***Budget-*** Must work in a specified financial limit; this can also work as a control mechanism.
- ***Availability-*** The time limit of the. Available resources must work around the schedule of the data scientists of the enterprise integration team.
- ***Lack of knowledge-*** ML/AI being a very wide subject, it can sometimes get overwhelming with excess of information.
- ***Data Security-*** With the sensitivity surrounding the data, it becomes ever so important to make sure to protect the data

6.3.4. Technical Effort Integration

The various technical efforts involved in integrating the use of analytics and machine learning to the team are as follows:

- *Core Industrial Engineers team working currently on ML and AI*
- *Data Scientists from Enterprise Integration team*
- *New recruits to the team specialized in Data Science*
- *IT team for data sourcing and collection*

The enterprise team can integrate the various resources and work simultaneously to reduce variety and save time and cost. One such scenario can be to work on a pilot project using the available resources and use the learnings achieved in this project to gather additional resources for further integration.

6.3.4.1 Training and Education

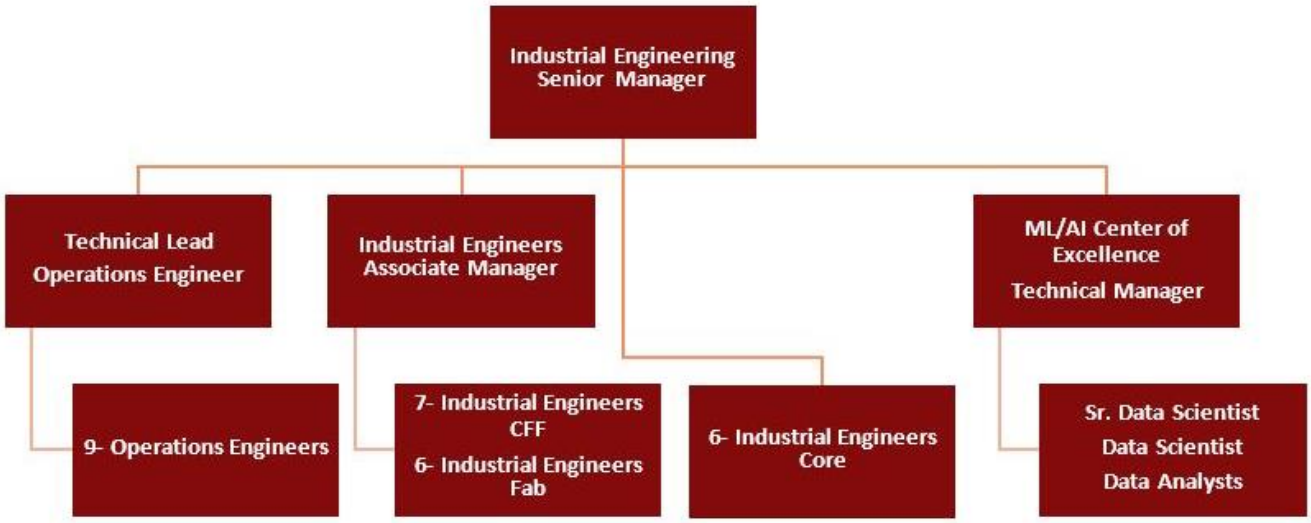
Training and education include all activities needed to ensure that managers, developers, users, During the project, training and education will be performed through the following activities:

- *Meetings and presentations*
- *Formal presentations by experts of enterprise integration team*
- *Videos and online material*
- *Formal classes*
- *Informal work sessions*
- *Hands-on practice sessions*

While specific training in focused areas will be needed, the growth will also be measured by how successfully it achieves the broader education of stakeholders and program personnel in how to accomplish effective management.

6.3.4.2. Responsibility and Authority

This section describes the organizing structure for the technical teams assigned to this technical effort and includes how the teams will be staffed and managed.



The Sr. Data Scientist or the technical manager must be designated in the second phase of the process. They can be appointed from the Enterprise integration team for a temporary basis or can be hired separately. They are going to be the main pillar of this concept that Enterprise team is targeting.

The Sr. Data Scientist or the technical manager will report to the Industrial Engineering Sr. Manager. They will also be responsible for building the team by recruiting the right talent or train the motivated IE's.

6.3.4.3 Roles for Individuals

The various technical efforts involved in integrating the use of analytics and machine learning to the team are as follows:

1. Core Industrial Engineers team working currently on ML and AI

Roles and Responsibilities:

- With subject knowledge, the team members currently having skills of data analytics should find areas where data analytics can be implemented.

2. Data Scientists from Enterprise Integration team

Intended Roles and Responsibilities:

- This team full of PhD scholar data scientists can be fully utilized to train the current employees and create a framework upon which the new data analysts can work on.
- Responsible for hiring or appointing a technical manager who will be leading the team of data scientists for the enterprise team.

3. New recruits to the team specializing in Data Science

Roles and Responsibilities:

- Bring the novelty and the depth of unexplored technologies to the IE team
- Familiarize with the day-to-day work and responsibilities of the IE team
- Figure out areas where the new technologies can be implemented, ex., work with a data driven thought process
- Accumulate and gather the data and efficiently store the data produced, utilize the IT resources to full value.

4. IT team for data sourcing and collection

Roles and Responsibilities:

- Team responsible to provide the team with resources to build the data driven framework
- Supply and source required software licensing and hardware like GPU etc.
- Responsible to provide the team with the large amount of data available
- Ensure data security

6.3.5. Common Technical Processes Implementation

6.3.5.1. Technical Processes

A responsibility assignment matrix describes the level of participation of each role in the implementation process tasks. The following nomenclature is used:
R = Responsible: The ones responsible for doing the task, there is always one role in every task that is responsible.
A = Accountable: The final approving authority, those accountable for the completion of the task and making sure the prerequisites are met.
C = Consultancy: Two-way communication for their input.
I = Informed: Ones who are not directly involved but informed as information could be useful in their tasks.

Code	Project sponsor	Subject matter expert	Data Engineer	Data analysts	Data Scientist/ML engineer	Software developer
Data Collection through instrumentation, logging, sensors, external data	A	R	C	C	I	R
Data flow, Extract-Transform-Load, Infrastructure pipelines, Data Storage	A	I	A, R	C	I	C
Explore/Transform, Cleaning, Preparation	I	I	C	A, R	C	I
Aggregates, Metrics, Analytics, Feature	I	C	I	A, R	R	I
Modelling algorithms, deep learning	I	C	I	I	A,R	I
Deployment stage	A	C	I	I	C	A,R

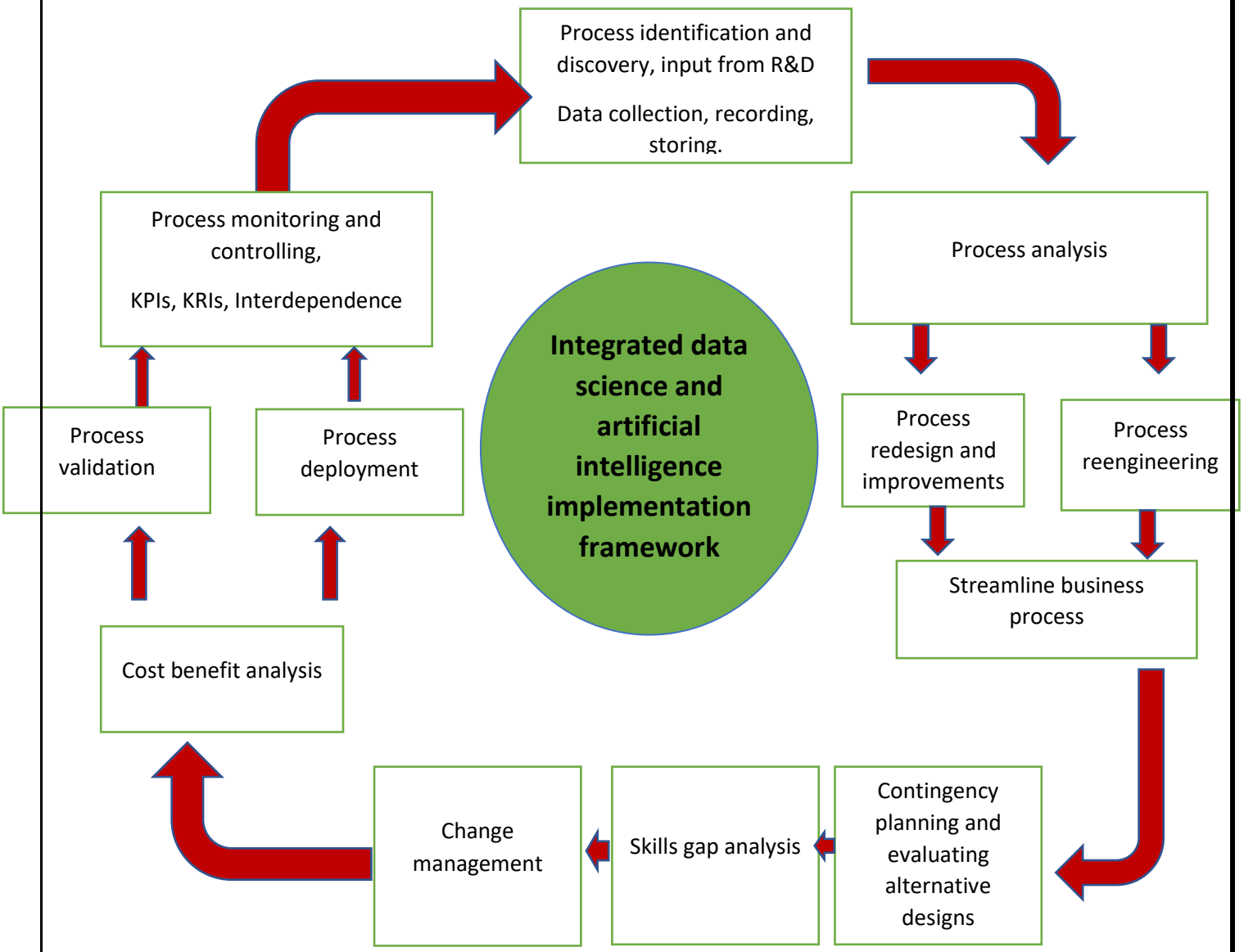
Table: Responsibility assignment matrix

The following table gives a Data to Business model to extract actions from the insights obtained in the technical process.

	Data Consolidation and structure	**Data Value Extraction**	**Insights transfer and implementation**	**Results communication and key decisions**
Mechanism	Production and design data Centralized data warehouse	Data value extraction meetings	Actionable insights application	KPI measurement and Key
Human resources	Trained and awaken data-suppliers including data engineers, production designers	Departments key stakeholders such as process owner, production manager, senior data scientist	Department key stakeholders and corresponding departments such as data analysts, data scientists and software developers	Department key stakeholders
Tasks	Understand number of application areas in the production pipeline. Understand what data each application area needs Create or use a tool accessible to organization	Extract actionable insights for further exploitation by managing cross-departments co-ordination during value extraction meetings	An efficient action items document A communicative leader in each department Extract actions to take for each insight Select project management approach	Define and monitor KPIs collectively Rethink KPIs to show results, block certitudes and avoid distress Link KPI to global business objective such as leading the innovation in the defense industry

6.3.6. Technology insertion

An outline below depicts a flow for implementing new technology in an existing process. For the case being discussed, new research in artificial intelligence can be implemented in a similar manner as shown. Some aspects of this flowchart such as change management and process reengineering were not discussed as the implementation is in its infancy.



6.3.7. Additional SE Functions and Activities

This section describes other areas not specifically included in previous sections but that are essential for proper planning and conduct of the overall technical effort.

6.3.7.1. System Safety

The system does not have any immediate safety concerns related to it. Implementation of the project will not require any kind of risk assessment for the system. However, it is necessary to make sure that while implementing the project it is made sure that the resources used are trustworthy and would not lead to any spread of confidential data that is processed in the operation and is of national defence. The systems would need to be analysed for data security.

6.3.7.2. Engineering Methods and Tools

The Enterprise Integration team already has personnel's' who are skilled in the field of implementation and can be available for help when needed. Thus, Enterprise group must join forces with the EI group and include the EI group while planning most of the project to ensure that the deadlines and expectations which are finalized are achievable.

6.3.7.3. Specialty Engineering

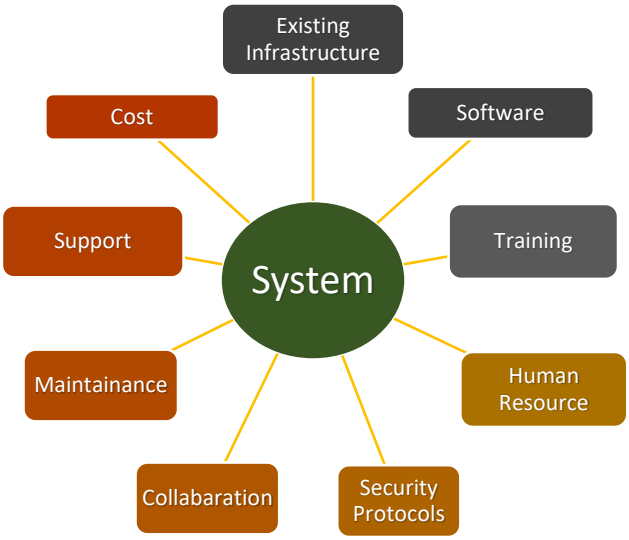


Fig. Specialty Engineering

While working on the system we need to make sure that the above factors are taken into consideration before finalizing the action plan for the project. This function might not be of great importance in the working of the system but if ignored can result into slowing down of process and eventually missing the deadlines. A few of these factors may also be important to monitor the applicability of the implementation process to the system and then control the system in later phases.

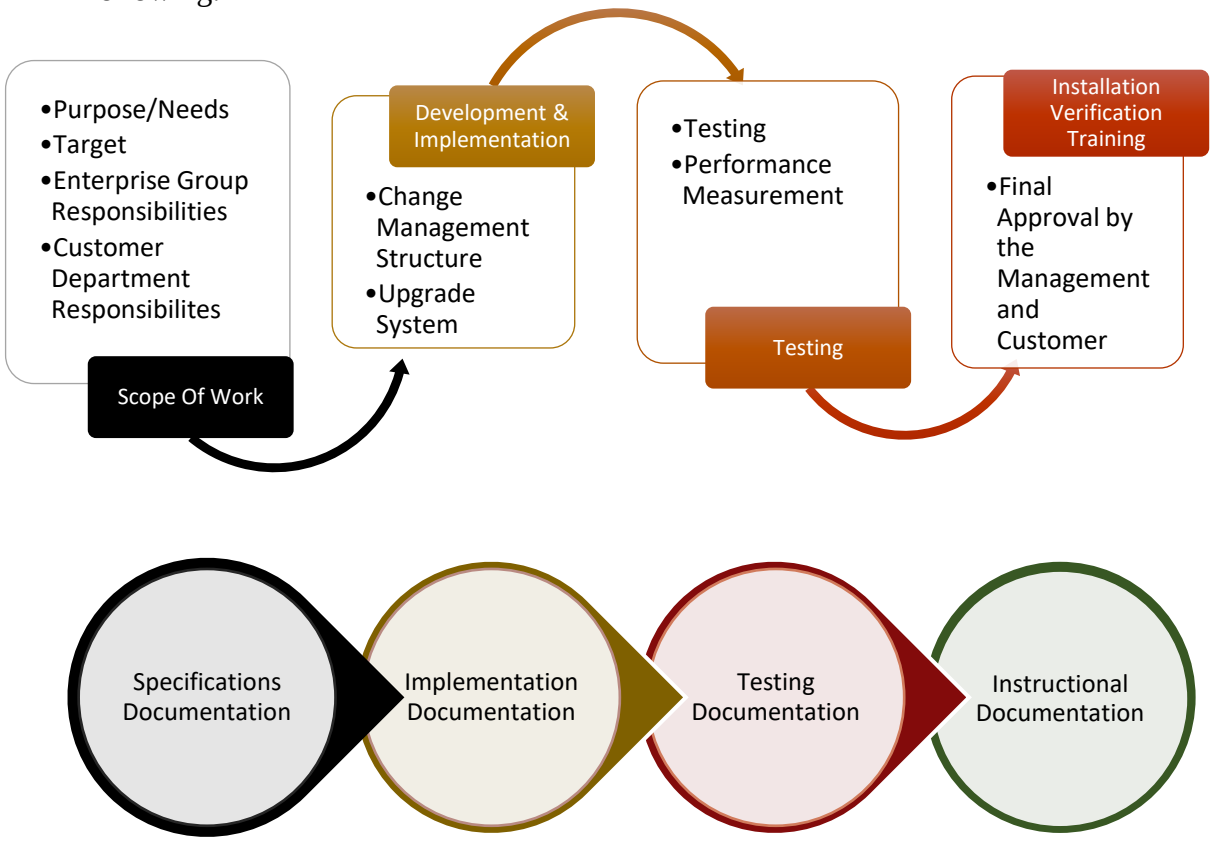
6.3.7.4. Technical Performance Measures

It is important in any implementation process to measure if the performance is satisfactory, or the customer expects more inputs and improvements in the process. A few key Performance Measures can be

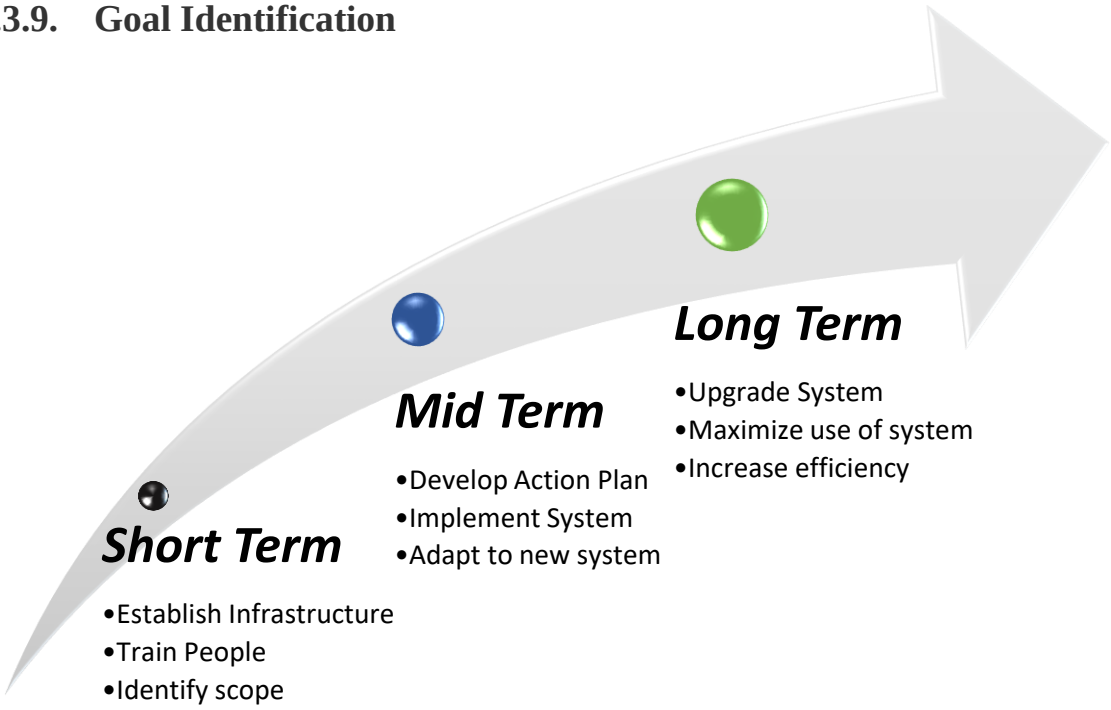
- Return on Investment
- Customer Satisfaction Rate
- MBO
- OKR
- KPI

6.3.8. Integration with the Implementation Plan and Technical Resource Allocation

System integration projects are considered costly and risky, as staying within the original project budget and timetable can be a challenge, specifications and scope of work keep changing constantly during the Implementation project and system maintenance of a finished, highly customized integration solution turns out to be difficult and expensive. Firstly, productivity may increase significantly due to system integration, as data needs to be entered and kept up to date in one place only, instead of manually re-keying the data into two or more separate systems. Secondly, because data needs to be entered only once, human typing errors and delays related to manual rekeying of data are minimized. The Project integration Phases can be defined as following.



6.3.9. Goal Identification



6.3.10. Road Map to Implementation

Phase	Activities	Time(Weeks)
Initiate	**Establish Infrastructure**	**12**
	Train and develop skillset	**14**
	Identify scope	**12**
Develop	**Develop Action Plan**	**20**
	Implement System	**20**
	Adapt to new system	**20**
Advance	**Upgrade System**	**15**
	Maximize use of system	**14**
	Increase efficiency	**18**
		145

7. Analysis of Alternatives

The proposed design is contrasted to the as-Is alternative in terms of performance in satisficing technical objectives, risks and estimated cost associated with implementation of the new technology and process.

The proposed design satisfices the objectives by:

- Contributing to increased customer value as lead time can be reduced by using machine learning for group technology or an automated custom feature can be added to the product using deep learning.
- Forming a framework and plan for implementing AI/ML and thus fostering innovation.
- Improving cross functional working efficiency by inclusion of roles from different departments in the process.
- Detailing the alternatives to build the data infrastructure and resources required

Although the nature present design is of low risk and not much difference is anticipated in that terms with regards to proposed design, the following risks and costs can be associated with pursuing the proposed design:

- Risks associated with data security: As more data will be collecting within and from external sources, changes may be required in the security protocols with regards to storing and transferring data within organization. However, as the organization already has world class cybersecurity technology in place, the risk is not influential.
- Risks associated with return on investment: According to Mr. Lyon, the cost associated with implementing data science is low in comparison to the benefits in automation and lead time reduction possible.
- Risks associated with business process reengineering: BPR follows any implementation of new technology and thus without appropriate change management techniques, bottlenecks and lack of communication will plague the streamline implementation.
- Risks associated with quality: In new technological trends, there is an inherent risk that there will be an exception due to which the technology will not work for a particular input, for example, in image recognition, the AI cannot differentiate certain images due to inherent flaws in technology and context.

Criteria	As-Is Model	Proposed To-Be Model
Return on investment	Good, less cost	Higher, more cost
Customer value	Good	Improved
Innovation	Standard process	Improved
Cross-functional	Limited	Higher
Data security	World-class	World class, more load
Change management	Not needed, well established process and team structure	Needed to balance process reengineering
Quality	High quality owing to continuous improvement	High quality owing to intelligently automated and consistent process

8. Recommendations

- Leverage the Data scientists from enterprise integration team to work alongside the Simio team members who have prior knowledge of ML/AI to analyse the scope and areas of implementing this new technology.
- An initial action plan would be to provide training to the team members on the new skills and tools required in ML/AI and meanwhile to recruit new data analysts/scientists who will be working in the new team.
- A technical manager, with extensive knowledge and experience in the field of data science should be appointed to lead the novel team.
- Build and procure infrastructure (both software, hardware, and the data).
- Set up goals and targets based on number of successfully implemented projects using AI/ML. Continue to grow the team to meet the increasing demand while considering cost analysis.
- Conduct change management techniques to balance the reengineering of processes carried out in implementing new technology.

9. Appendices

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