

LOYOLA MARYMOUNT UNIVERSITY

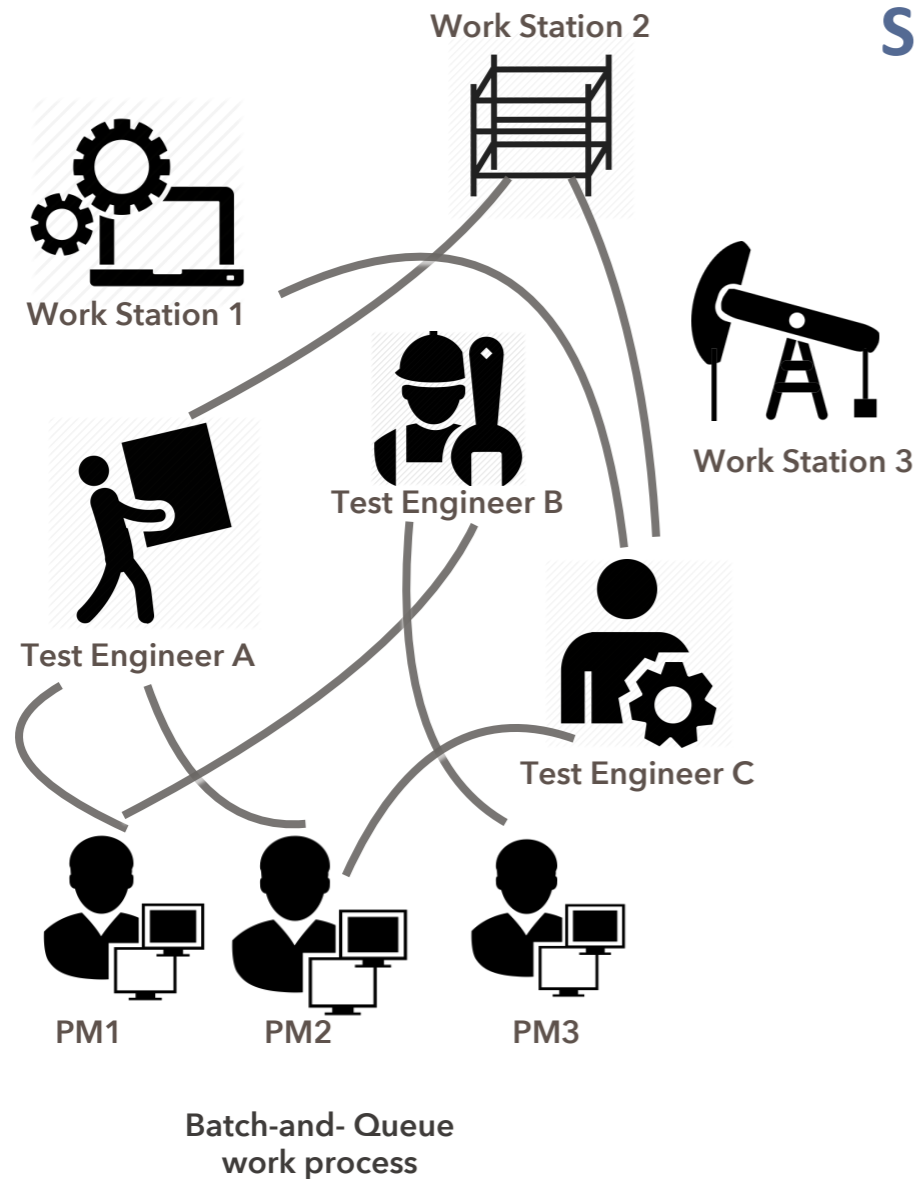
LEAN THINKING ON TEST PROCESS

SAGEM COMMUNICATION.INC

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PROBLEM DEFINITION



SAGEM COMMUNICATION:

DISJOINTED FACILITIES/ DISTRIBUTED WORK STATIONS

RESOURCE ACCESS CONFLICTS: WORK STATIONS/ TEST TOOLS ACCESS CONTENTION

ARGUMENTS BETWEEN PMS: ARGUMENTS ABOUT TEST PRIORITY

NEGATIVE WORK ATTITUDE AT TEST ENGINEERS: TEST ENGINEERS NOT MOTIVATED TO WORK HARD

MISTRUST BETWEEN TEST ENGINEERS AND PMS: NO VISIBLE PROCESS CONTROL; ENGINEERS COMPLAIN TOO MUCH WORK, PMS COMPLAIN WORK TOO SLOW

TEST ENGINEERS COMPLAIN TEST TOOLS IS TOO COMPLICATED

SAGEM COMMUNICATION. INC
TEST DEPARTMENT
Huge waste on people, facility, time

Problems: Inefficient/ Arguments/ Waiting/ Complaints / Work Negative Attitude/ Defective Outputs

CUSTOMER AND VALUE

CUSTOMERS:

- 1) PROJECT MANAGERS
- 2) PROJECT RESEARCH AND DESIGN WORKERS
- 3) PRODUCT MANAGERS.



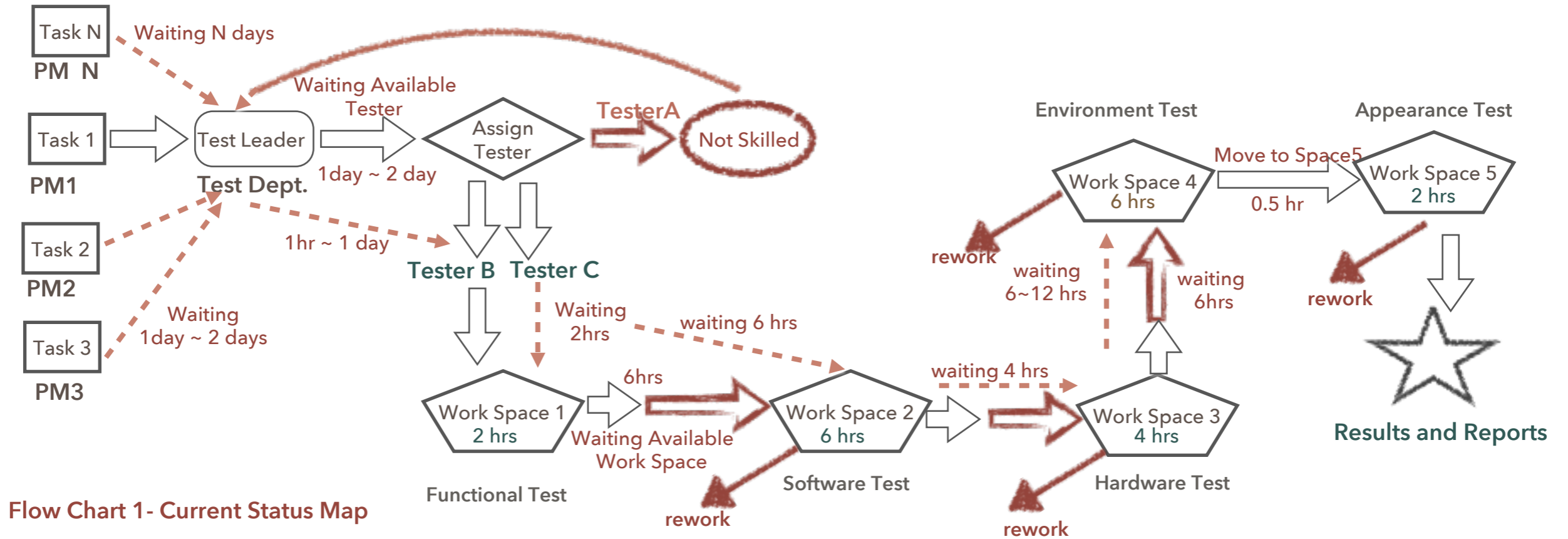
Customers



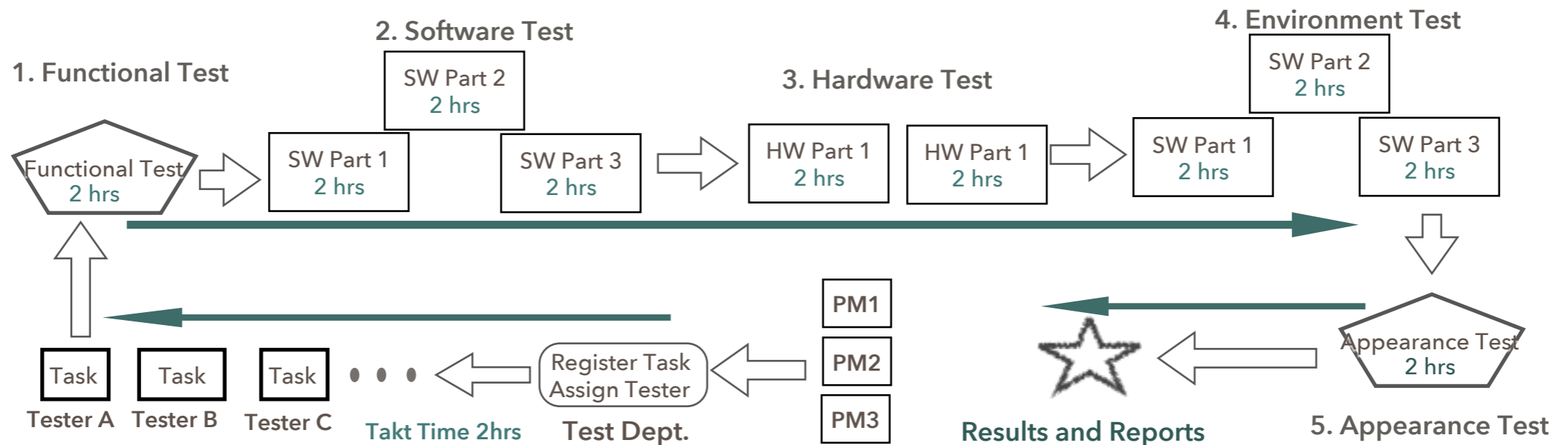
Values

- Value: test report data
- 1) Short delivery of test reports
- 2) High quality of report
- 3) Nicely serviced - good relationships between test engineers and PM, good cooperation between engineers
- 4) Low cost - fewest test engineers and test facility to get the test reports.

CURRENT STATES AND FUTURE STATES



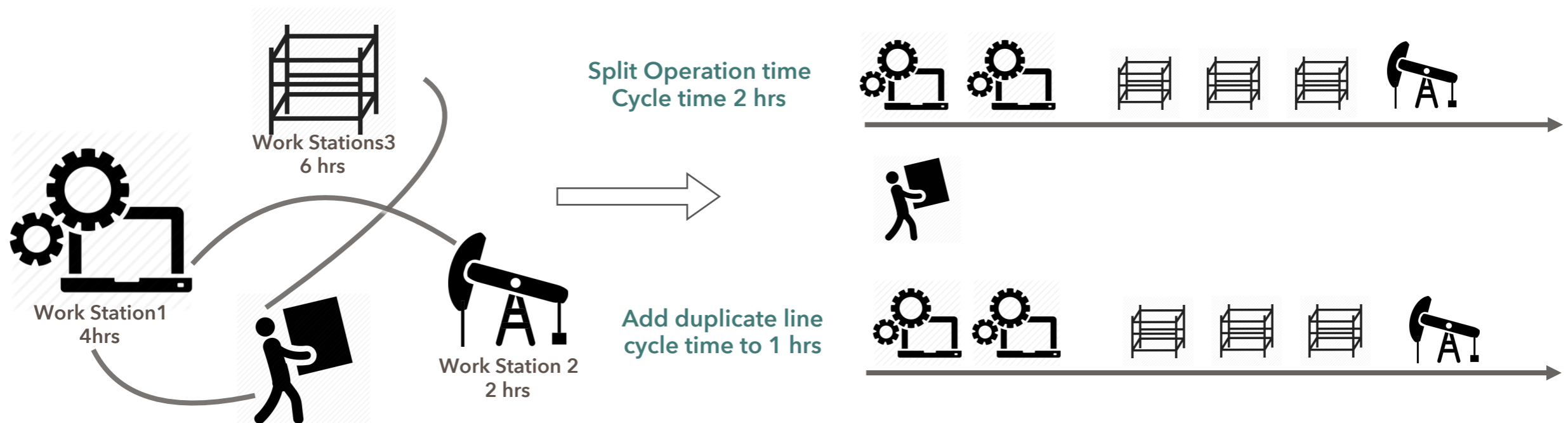
Flow Chart 2- Future Status Map



FLOW STREAMLINING

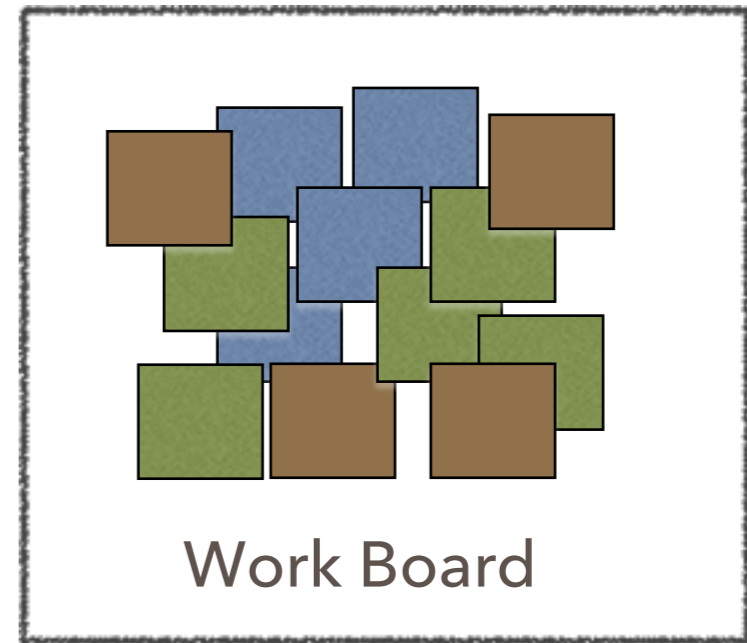
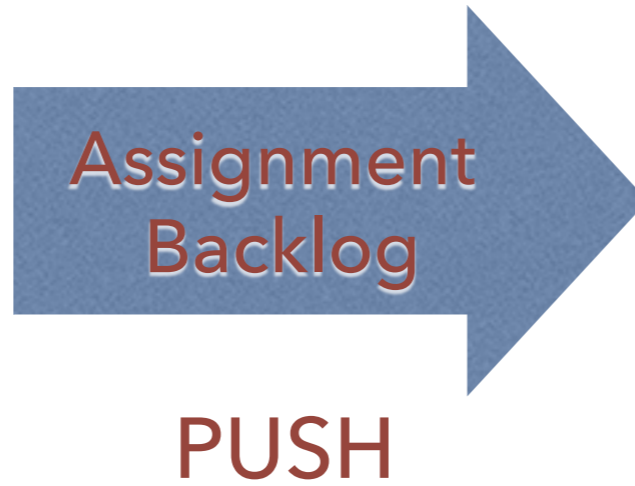
From Current Batch-and-Queue VSM to future Lean VSM

- 1) PUT ALL DISJOINTED TEST WORK SPACES INTO ONE LOCATION
- 2) PUT ALL TEST WORK STATIONS INTO ONE LINE
- 3) STANDARDIZE TASKS, ALL OPERATION TIME TO TARK TIME; FOR EXAMPLE TEST PROCESS 2 SOFTWARE TEST 6 HRS COULD SPLIT TO 3 PARTS, 2 HRS EACH
- 4) REPLACE THE BIG AND COMPLICATED TEST MACHINES WITH SMALL AND SIMPLE TEST MACHINES, ADD DUPLICATE TEST STATIONS WHEN NEEDED
- 5) CROSS TRAINING TEST ENGINEERS TO MAKE SURE THE FLOW CAN WORK PERFECTLY.

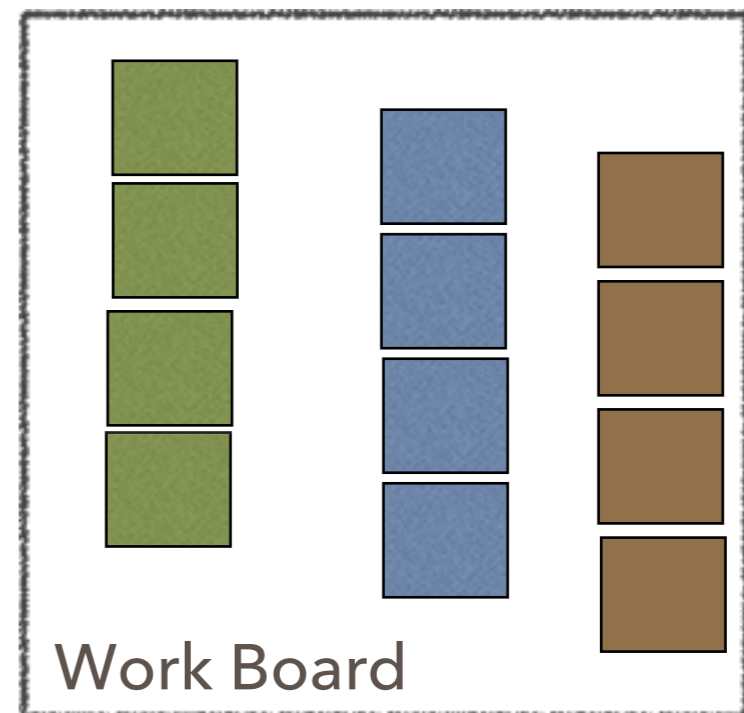
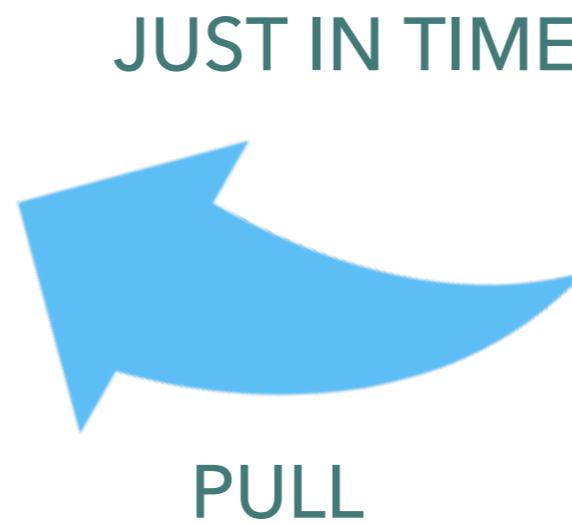
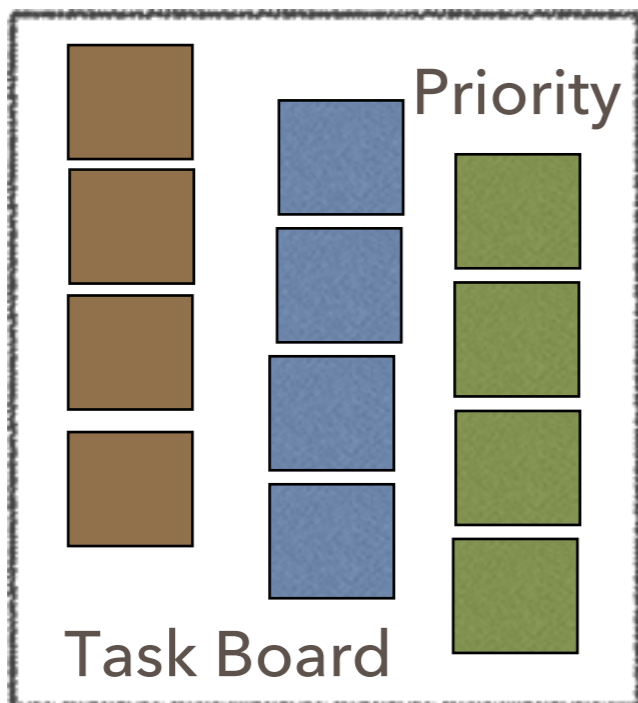


PULL PRINCIPLE

Old



New






PERFECTION

KANBAN FOR TEST ENGINEERS

- 1) LIST THE TEST PROCESS AND STEPS TO ONE CARD
- 2) MARK/ RECORD IN AND OUT TIME FOR EACH TASK AND EACH PROCESS



- **Visual Control**

- 1) Building a **test status tacking system** to make the test status transparent to all: product managers, test managers.
 - **Green** = ok 
 - **Yellow** = warning 
 - **Red** = help needed immediately 
- 2) the product managers could track the test progress
- 3) the test managers could go to help any problems occurs

- **Gemba**

- test leader need go to actual place to see actual people and actual work

- **Test Tools**

- **kits or point-of-use carts** to keep the test tools
- the carts labeled with work station, name, date, use instructions



IMPLEMENTATION METHODS

STANDARDIZED WORK PROCESS:

- 1) STANDARDIZE TEST ITEMS PROCEDURES, TEST FORMS, STANDARDIZE TEST CYCLE TIME AND TAKT TIME ;
- 2) MAKE SURE ALL THE DETAILS AND SPECIFICITY IS DOCUMENTED WITH PICTURES, EXAMPLES, USED FOR INITIAL TRAINING AND CONTINUAL REFRESH.



• Test Machine and Tools Change:

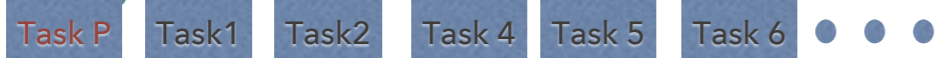
- 1) Replace expensive and large test machine/ tools with small and cheap ones;
- 2) Replace the complicated and “do it all” test tools with easy to use and cheaper specialized ones;
- 3) Replace the non-moving test equipments with movable ones.

• Level Scheduling - Heijunka

- Practice level scheduling to smooth the task variations.



- Priority task, schedule the task to the first



• Cross Training Test Engineers:

- Train test engineer from single-skilled operators to multi-skilled operators.



Training

THE IMPROVEMENT SUMMARY TABLE

| | Current | Future | Notes |
|-----------------------------|--|--|-------|
| Delivery Time | for one task, 20 hrs test + about 24 hrs to 44 hrs waiting | for one task, 20mins tark time + 20 hrs test time | |
| Quality | repeat/redo work rate about 25%~40%, data errors rate about 5%~10% | repeat/redo work rate expected to zero, data errors rate expected to under 1% | |
| Service | test engineers have negative attitude, complain too much test work, not willing to take the new task | test task flows smoothly, test engineers have positive work attitude, willing to take the new task | |
| Cost | large, complicated, and expensive test tool; money waste on waiting time and human resources | smaller and cheaper test equipment; more efficient less cost on facility and human resources | |
| Test Engineer Skills | test engineers only single test skill, either for single test equipment or product | test engineers been well trained, multi-skilled, operate more machines, could test more products | |
| Work Environment | work space in a mess, disjointed work space, dysfunctional work stations | neat, clean, safe, a straight line work station, better and organized work environment | |
| Worker Relationships | eigneers work alone, few communications between workers | cross training, workers work together, corporate with each other | |
| Company Reputation | defect products, the product quality is poor, the reputation of company is poor | Fewer defects, better quality control, better products, better reputation | |
| Psychology | test engineers would not like stay and work in the company | test engineers enjoy work at lean environment. high loyalty | |

SUMMARY AND CONCLUSIONS

1. APPLY LEAN THINKING TO TEST PROCESS WITH SIX LEAN PRINCIPLES, RELATED LEAN METHODS AND LEAN TOOLS.

2. THE KEY ELEMENTS OF LEAN THINKING IS

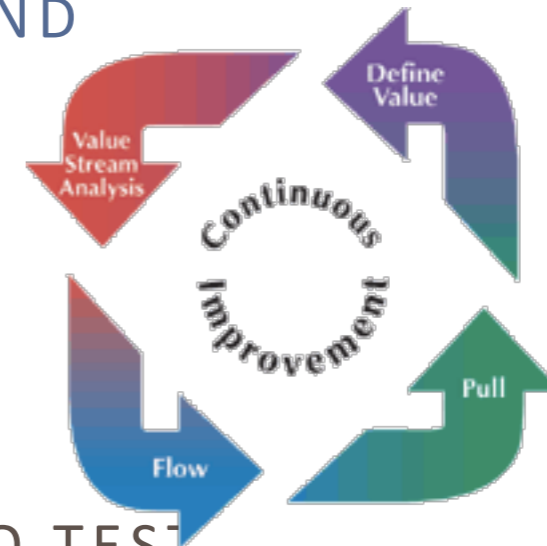
1) IDENTIFY WASTES

2) ELIMINATE WASTES

3. THE BENEFIT OF LEAN THINKING APPLYING TO TEST PROCESS:

SHORT DELIVERY TIME, RELIABLE REPORTS DATA,
NICELY SERVICE, LOWER COST FOR THE COMPANY

IMPROVEMENT OF TEST ENGINEERS SKILLS, WORK
ENVIRONMENT, WORKER RELATIONSHIPS, BETTER
COMPANY REPUTATIONS, ETC.



REFLECTION

WHAT COULD HAVE BEEN DONE BETTER?

COULD IDENTIFY MORE WASTE AT TEST PROCESS, AND ELIMINATE THE WASTE;

THE TAKT TIME COULD BE SHORTER, TRAINING THE TEST ENGINEERS TO EXPERTS

COULD INTRODUCE JIDOKA AND POKA-YOKE SYSTEM TO PREVENT THE ERRORS, MAKE THE REPORTS GO TO "ZERO DEFECTS"

THE IMPROVEMENT IS UNLIMITED, ENCOURAGE EVERYONE TO MAKE THE SYSTEM BETTER



• What have I learned?

- Lean Thinking and its principles, method can bring in dramatically change to the company, such as reducing cost, raising production, improving quality of products, etc.
- We could apply lean principles and methods to all kinds of different industry, such as manufacturing, healthcare system, etc.
- We also apply lean to our everyday life

QUESTIONS?