CAMBRIDGE AUTO-ID CENTRE

Integration

of

Auto-ID Tagging System

with

Holonic Manufacturing System

Chien Yaw WONG

13 June 2001

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PRESENTATION OVERVIEW

Background

Auto-ID Tagging System

Distributed Manufacturing System

The Benefit of Integration

The Integration

Video Demonstration

Future Recommendation

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BACKGROUND

AIMS OF PROJECT:

      To Integrate Auto-ID Tagging System

      with Distributed Manufacturing Control

TIMELINE:

      Seven Weeks of Project

      Three weeks of Integration

Background

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AUTO-ID TAGGING SYSTEM

- **PML Files**

    - XML, XQL-enabled

- **96 Bit ePC Identification Number**

    - Read from tag

- **ONS**

- **Local and Global Savant**

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DISTRIBUTED MANUFACTURING CONTROL

INTRODUCTION

CONVENTIONAL ARCHITECTURE

DISTRIBUTED (HOLONIC) ARCHITECTURE
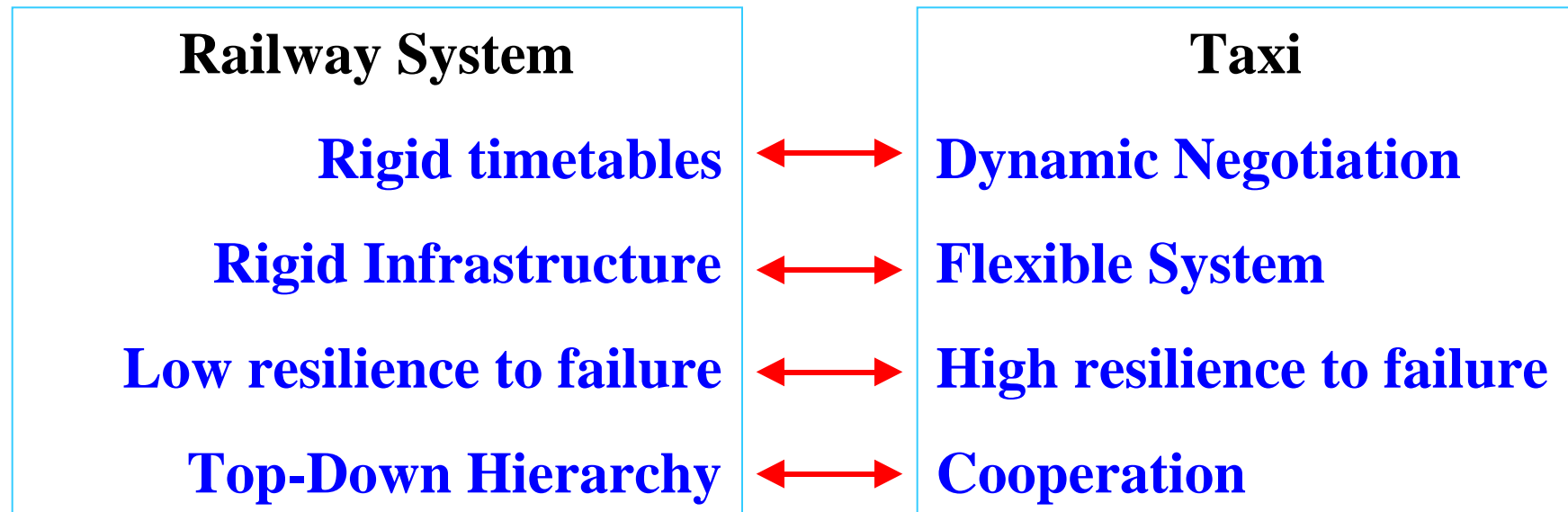
DISTRIBUTED MANUFACTURING SYSTEM

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INTRODUCTION

Railway System		Taxi
Rigid timetables	⟷	**Dynamic Negotiation**
Rigid Infrastructure	⟷	**Flexible System**
Low resilience to failure	⟷	**High resilience to failure**
Top-Down Hierarchy	⟷	**Cooperation**

Conventional   **vs**   **Distributed**

DISTRIBUTED MANUFACTURING SYSTEM

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CONVENTIONAL ARCHITECTURE

Engineering Database

Process Plan

Control systems

machine

machine

machine
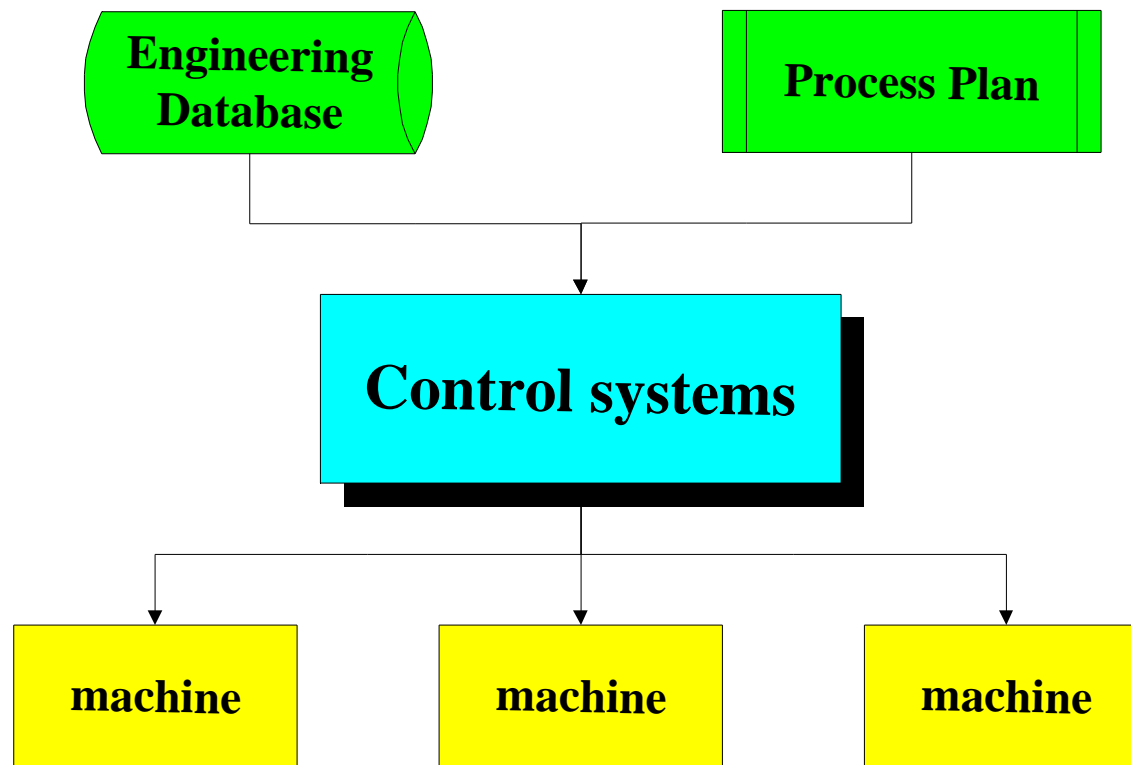
Advantages:

Deterministic

High Control

Disadvantages:

Complex

Low Flexibility

DISTRIBUTED MANUFACTURING SYSTEM

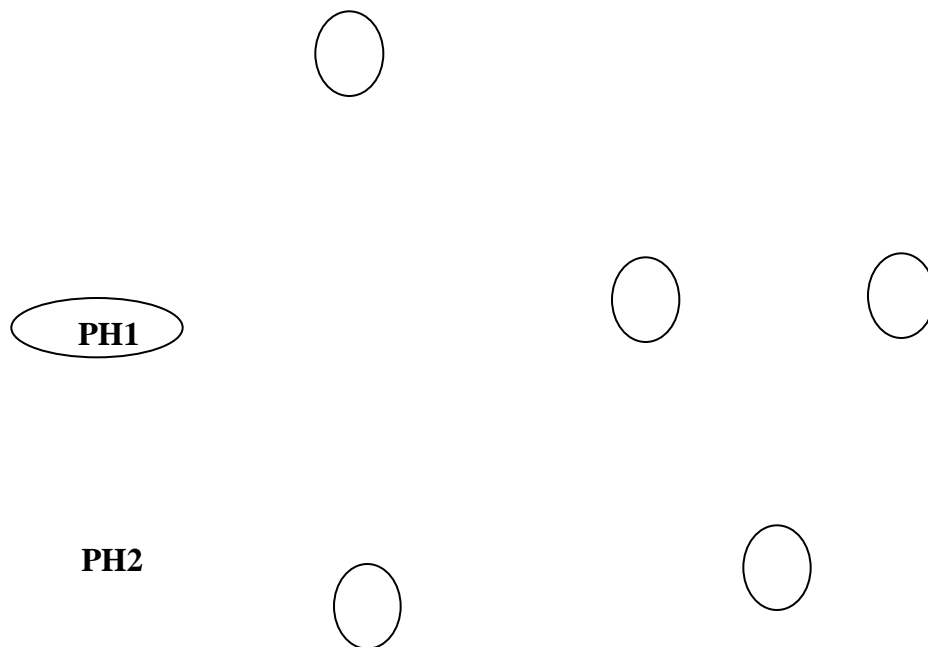MIT AUTO-ID CENTER

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HOLONIC ARCHITECTURE

PH1

PH2

Advantages:

`No Scheduling'

Customization

Resilient

Disadvantages:

More sophisticated

algorithm required

HOLONIC MANUFACTURING SYSTEM

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THE BENEFIT OF INTEGRATION

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| DISTRIBUTED MANUFACTURING	AUTO-ID TAGGING
• Distributed (Holonic) Control • Individual Product Customisation • `No Scheduling' Possible	• Product Information Availability • Individual Product Identification • `All Data' Possible

INTEGRATED SYSTEM

•Dynamic product mix based on customer requirements

•Further WIP customisation during assembly

•Accurate Diagnostic and Prognostic Capability

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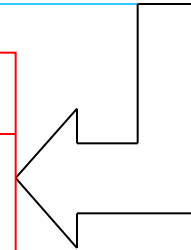
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THE INTEGRATION

INTEGRATION APPROACH

XCHANGE-HMS ARCHITECTURE
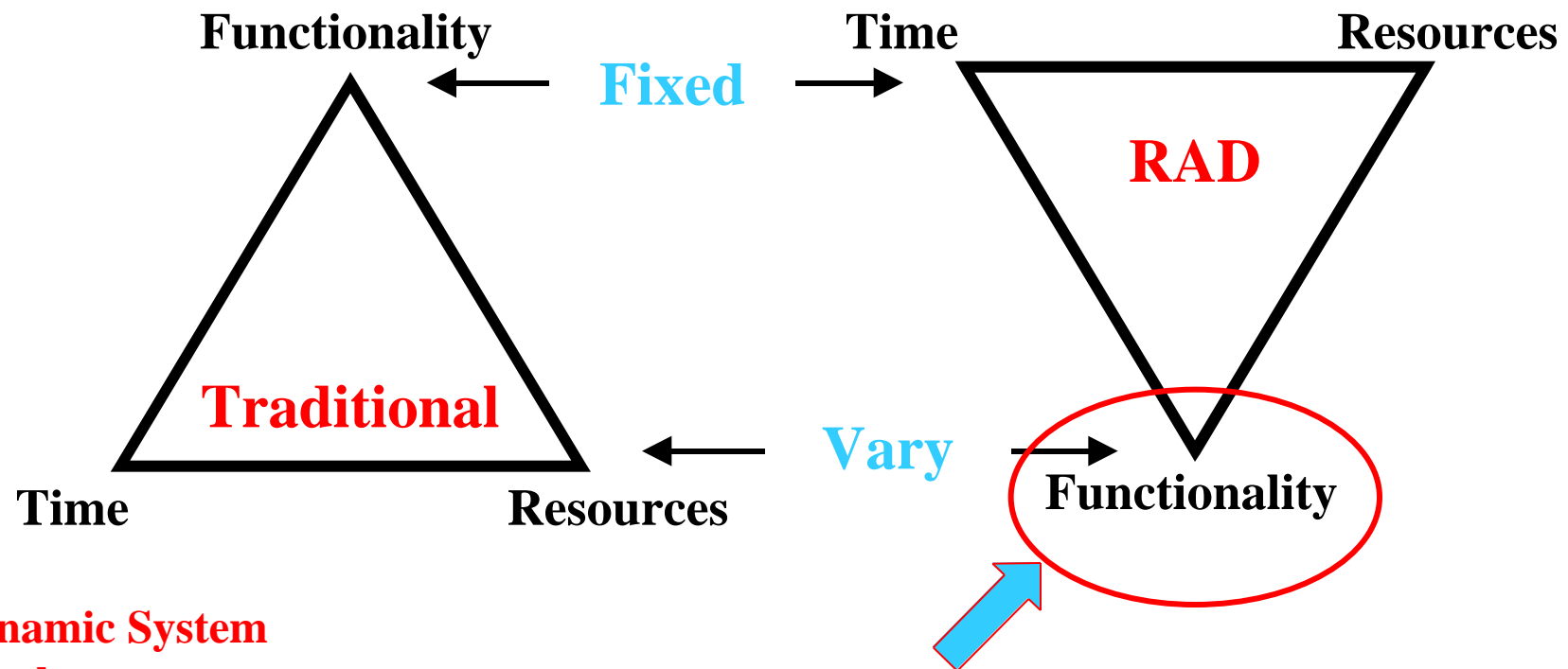
XCHANGE-CRMInterface ARCHITECTURE

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INTEGRATION APPROACH

Functionality   **Time**   **Resources**

Fixed

RAD

Traditional

Time   **Resources**

Vary   **Functionality**

**Dynamic System
Development
Methodology
(DSDM)**

CSFs, Sophistication Timeboxing, MOSCOW

THE INTEGRATION

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Production Processes

ePC

Holonic Manufacturing System

ePC

| Raw Materials | Suppliers | Production Processes | Retailers | Customers | Recycling |

ONS

ONS

Server

PML
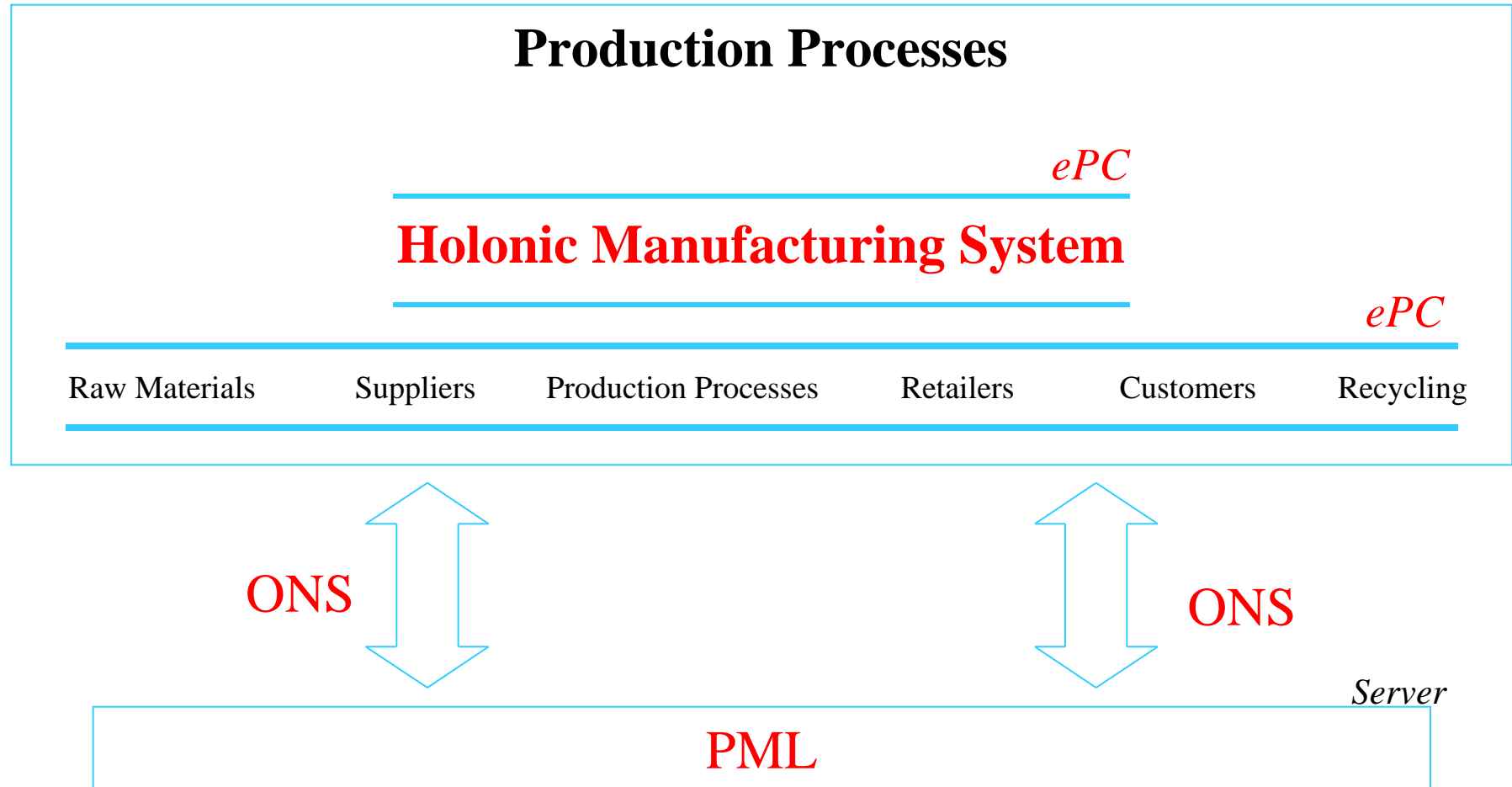
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XCHANGE-HMS ARCHITECTURE
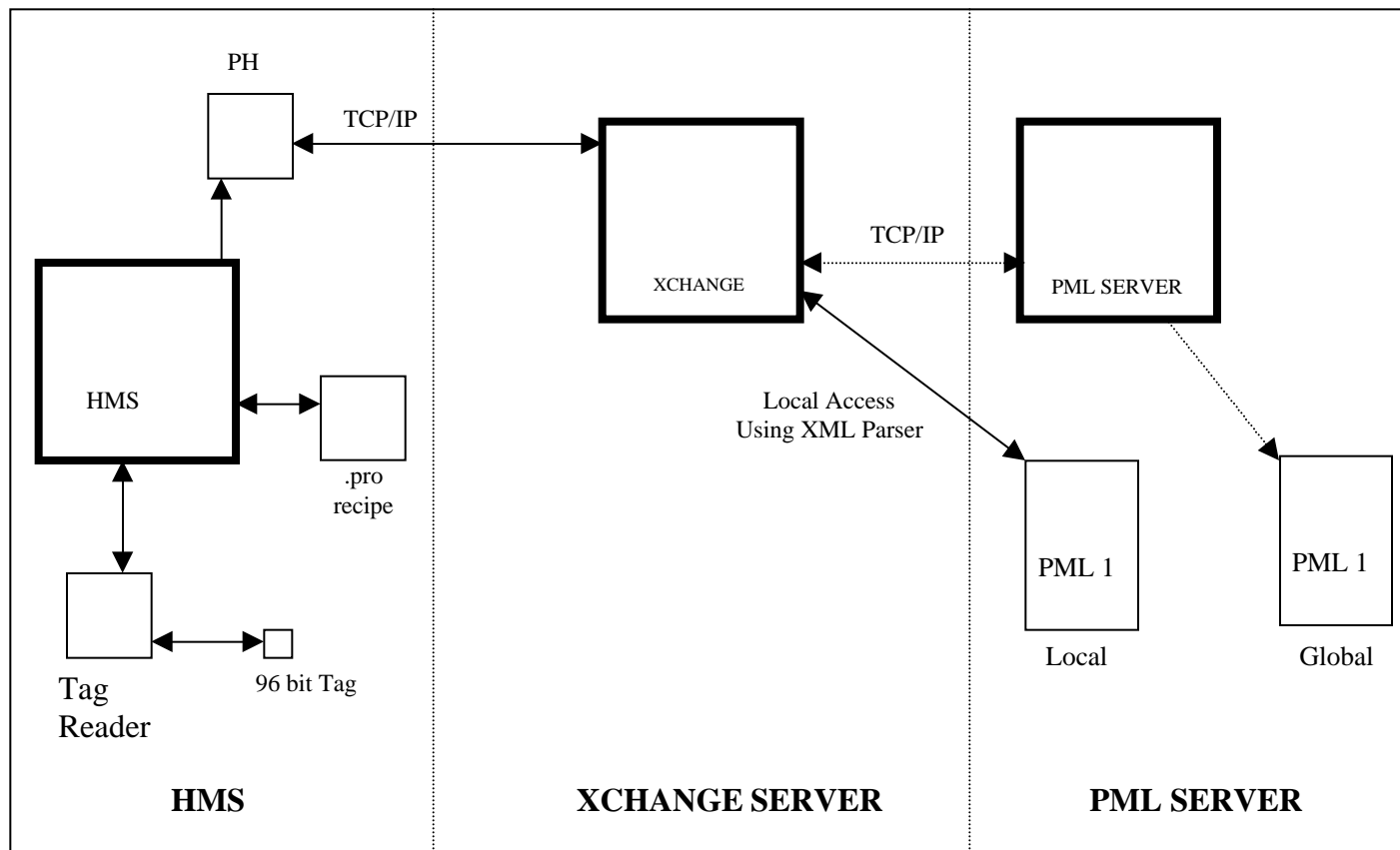
PH

TCP/IP

HMS

.pro recipe

Tag Reader

96 bit Tag

XCHANGE

TCP/IP

PML SERVER

Local Access Using XML Parser

PML 1

Local

PML 1

Global

HMS

XCHANGE SERVER

PML SERVER

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XCHANGE-CRMInterface ARCHITECTURE
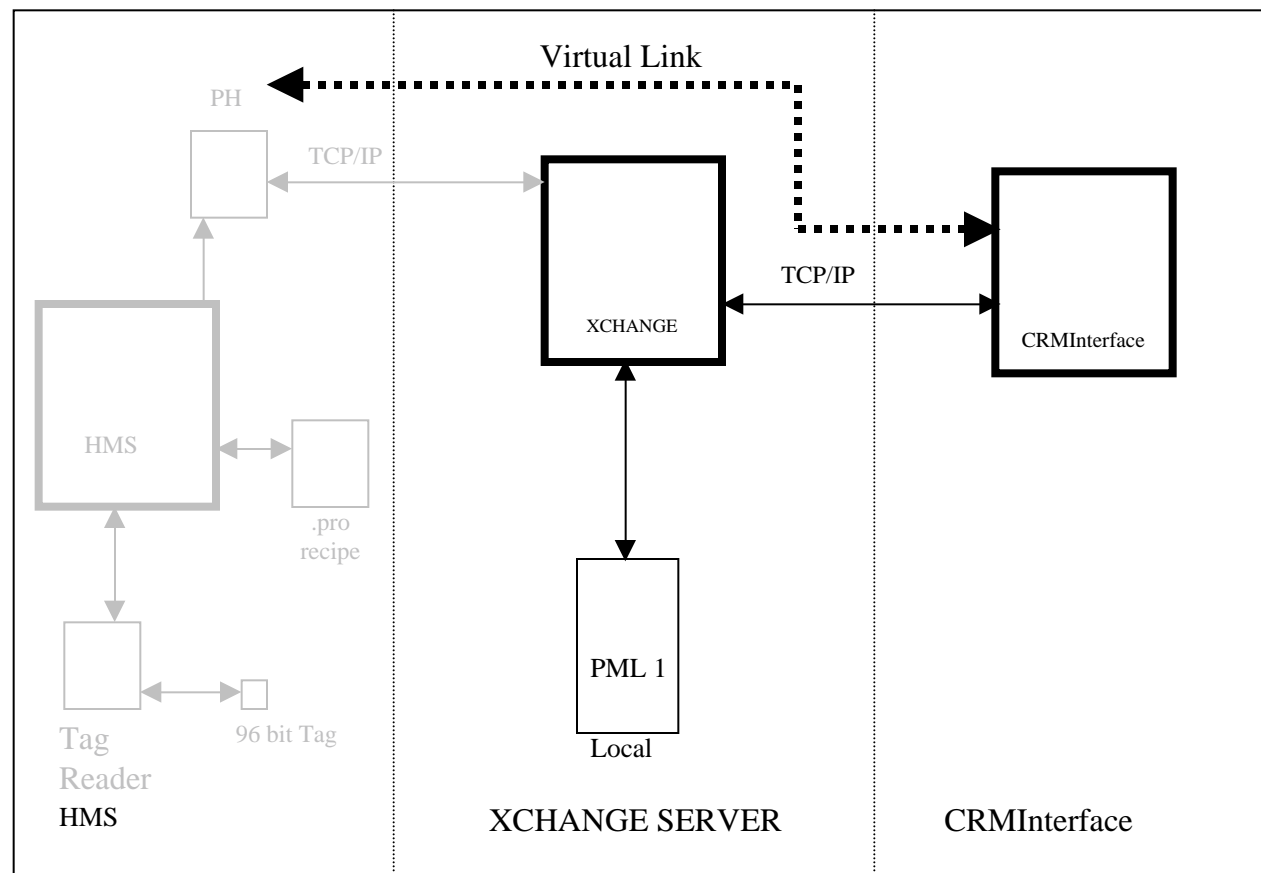
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VIDEO DEMONSTRATION

Front Screw

Glass Window

Part C

Frame part B

Base part A

Rear screws
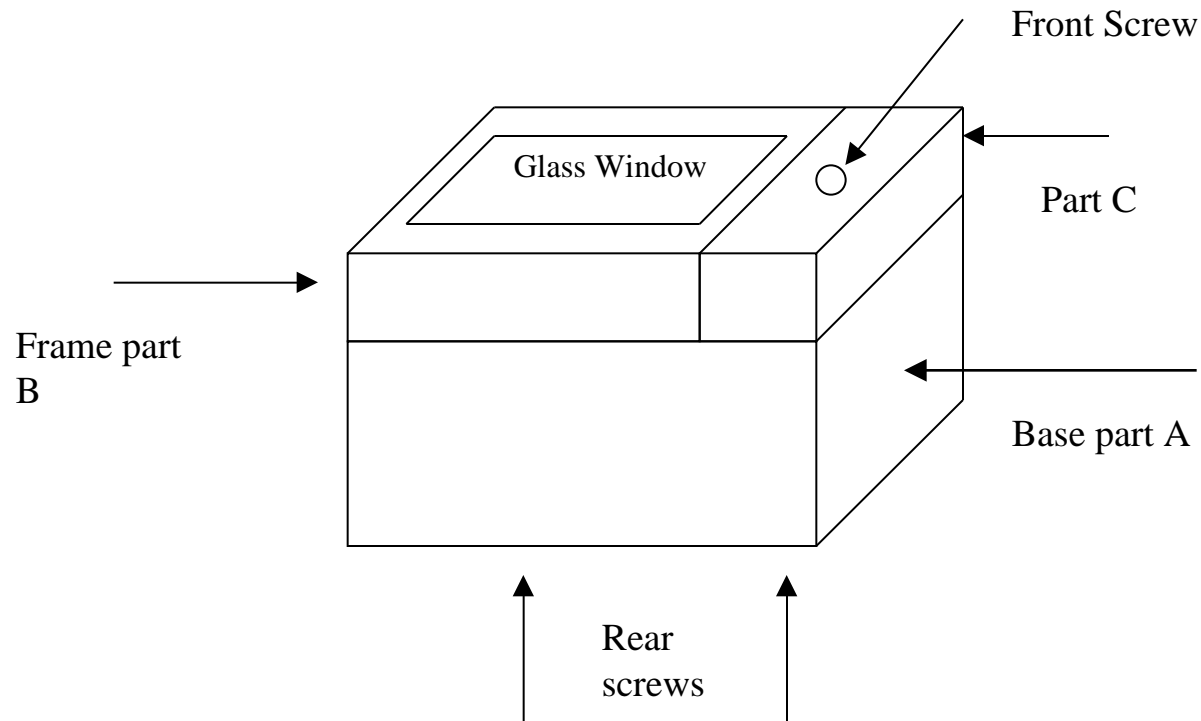
VIDEO DEMONSTRATION

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VIDEO DEMONSTRATION

Scenario 1 Make Part AC
Similar Product, Unique Identification

Customer A: Make AC

Customer B: Make AC

Scenario 2 Part AC
Intelligent Product Status Update

Customer A: None

Customer B: None

Scenario 3 Make Part ABC from Part AC
Further Customer Customization
Execution

Customer A: None

Customer B: Make ABC

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VIDEO DEMONSTRATION

Not Available

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FUTURE RECOMMENDATION

- **Local & Global PML Access**

- **Intelligent Agents**

   Utilize the wealth of information

- **Security**

- **Pushing the boundaries of e-Manufacturing:**

   e-SCM, e-CRM, e-Design integration

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Questions and Answers

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