

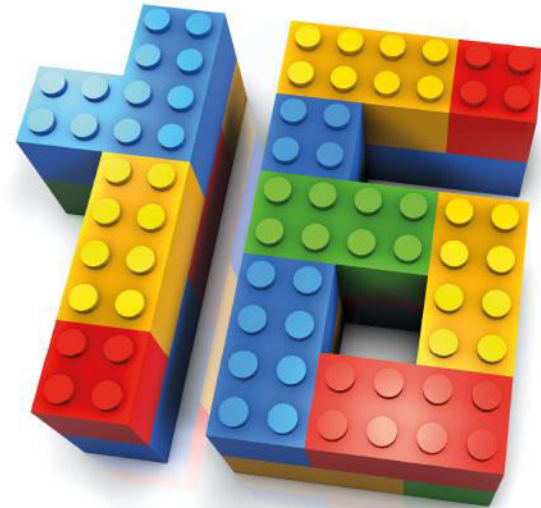


30 May - 1 June 2016

Athens Ledra Hotel

Athens, Greece

www.euromaintenance2016.org



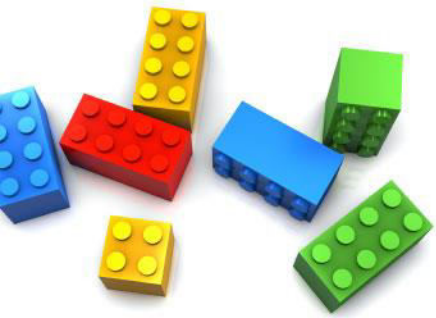
Internet Plus Based Maintenance ——New Feature of the Time

Li Baowen

Shareford International Consulting Group Company Limited
Industrial and Plant Engineering Institute of Guangzhou University

shflibaowen@163.com, web page:<http://www.tnpm.org> Organisers

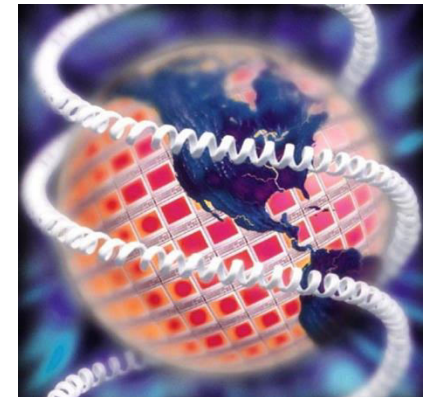




The Challenge of the Time



- By the end of 2008, CEO of IBM raised the concept of Smart Planet;
- 2011, The concept of Industrial 4.0 is raised by Germany, and Platform-i4.0 is formed in 2013 then, which was also written in 《High-tech Strategy 2020》 by the government.



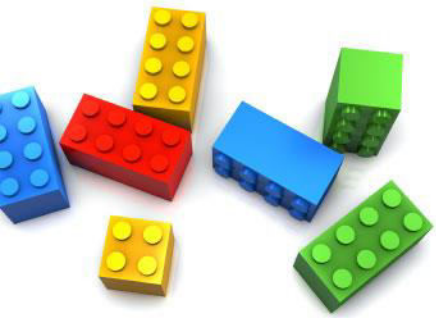


What is the Time of Internet + ?

It is

- The system upgrading of the society;
- Knowledge and society innovation promoted integration and evolution among internet and all industries;
- New economic type;
- Optimization and integration of internet in production resource distribution;
- Innovation achievement of internet is deeply integrated all fields of economy and society, in order to increase the productivity and creativity of the substantial economy;
- **A new developing economic trend based on internet as its foundation and tools.**

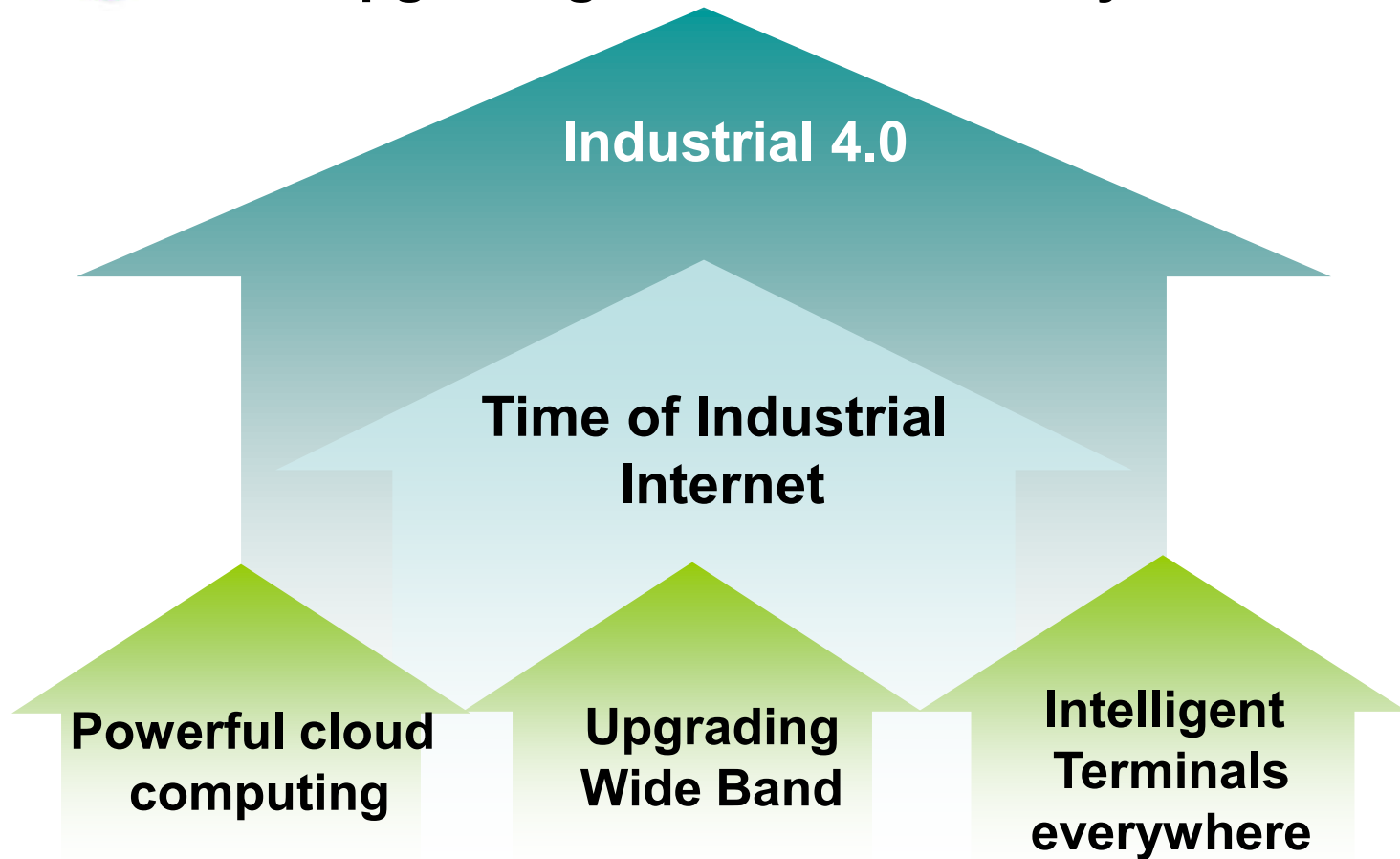




Arrival of Industrial Internet



Upgrading of Global Economy



Background and Advantage of Smart Maintenance

Background

- More feasible production
- More continuous process
- Instruments are cheaper
- Labor salary is increasing
- Plant is much bigger & danger
- Breakdown time is rigorously limited
- High cost of breakdown maintenance
- Difficult to handle the maintenance tech.
- Rigorous HSE is required by the society

Advantages

- Feasible to a complicated system
- Monitoring, managing continuously
- Cost effective and controllable
- Less people employed
- Mobile terminals are used
- Condition based M.
- More preventive
- remote-education
- Less hazards

Internet+ based Maintenance

Stockholder
Satisfied

Customer
Satisfied

Society
Satisfied

Employee
Satisfied

Three Phases of Smart Maintenance



Plant+ OS+ Net Smart maintenance

CPS

.....

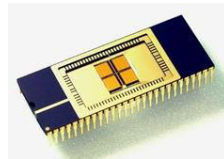
Plant life circle digitalization

Plant maintenance digitalization

Plant condition and operation digitalization

Plant position & status

Plant Information digitalization



Plant+Chip (MEMS)

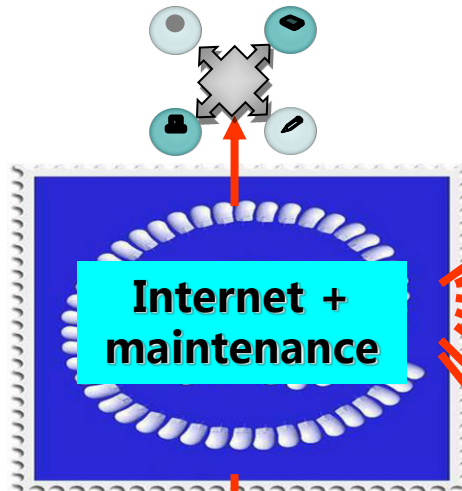


Plant+RFID



Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot



Smart inspecting



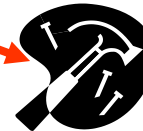
Smart information managing



Smart analyzing & diagnosing



Smart knowledge managing



Interactive maintenance manual



Smart training & learning



Smart spare parts management

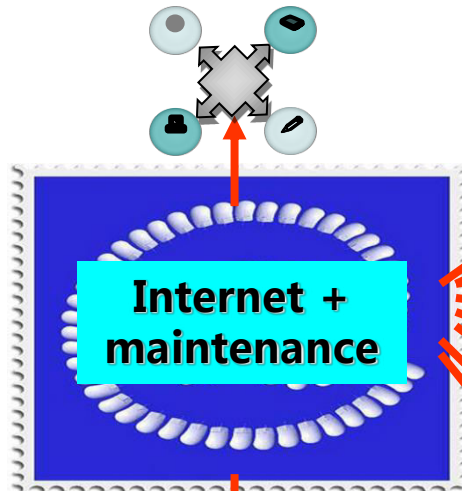


Smart integrated service

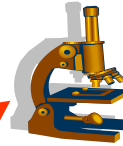


Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot



Smart inspecting



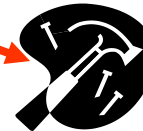
Smart information managing



Smart analyzing & diagnosing



Smart knowledge managing



Interactive maintenance manual



Smart training & learning



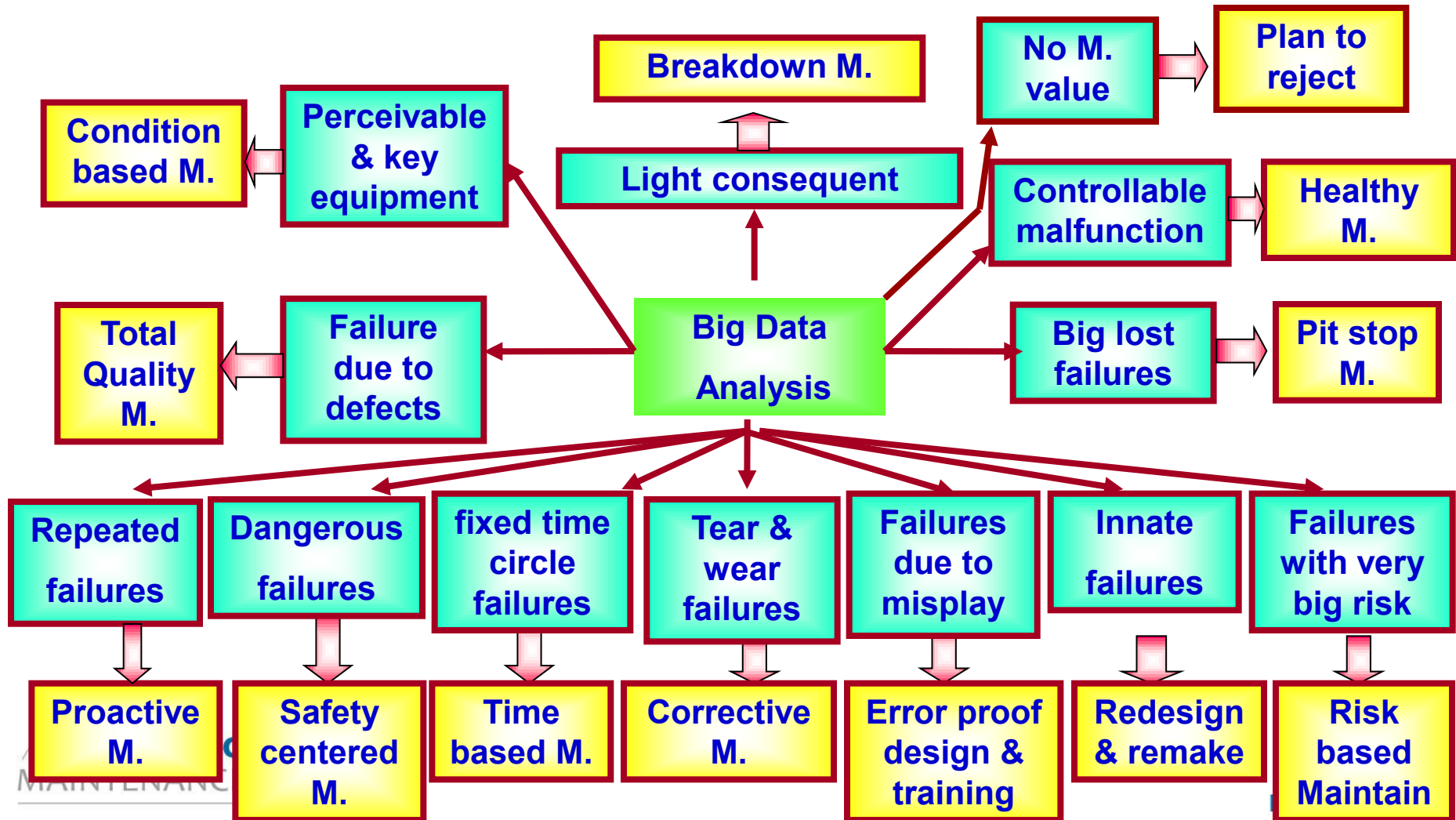
Smart spare parts management



Smart integrated service



Smart maintenance strategy generation



Brief Introduction of smart maintenance

Smart maintenance strategy generation

Smart inspecting

Smart information managing

Smart analyzing & diagnosing

Smart knowledge managing

Interactive maintenance manual

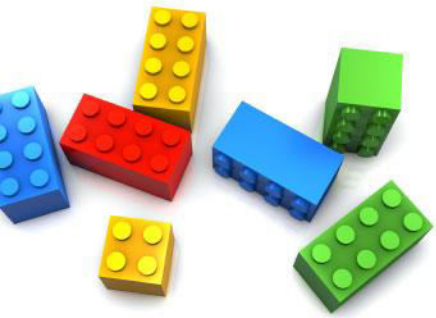
Smart training & learning

Smart spare parts management

Smart integrated service

Internet + maintenance

Maintenance Robot

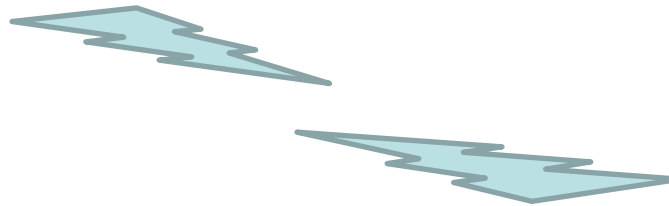


Smart inspecting



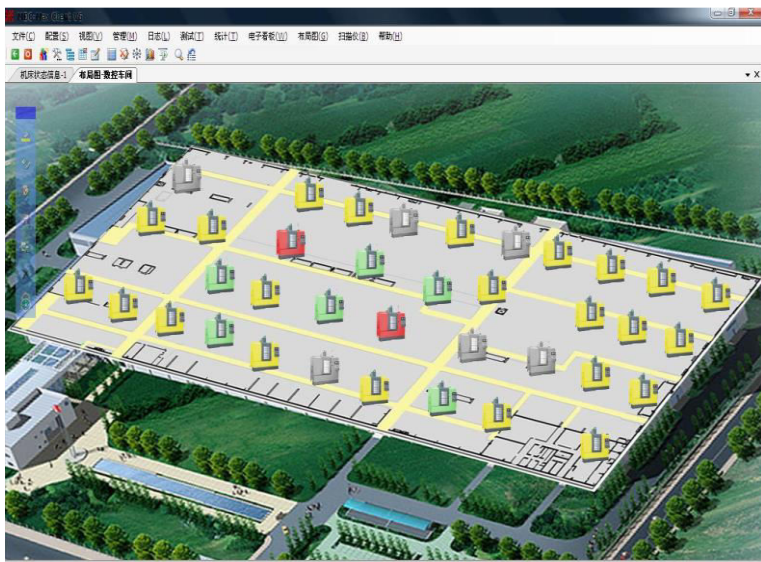
Definition and features

- The plant or equipment are inspected or checked by operators or engineers with condition monitoring instruments or simple electronic tools such as the personal digital assistant-PDA, real time communication with the center server is carried out through internet.



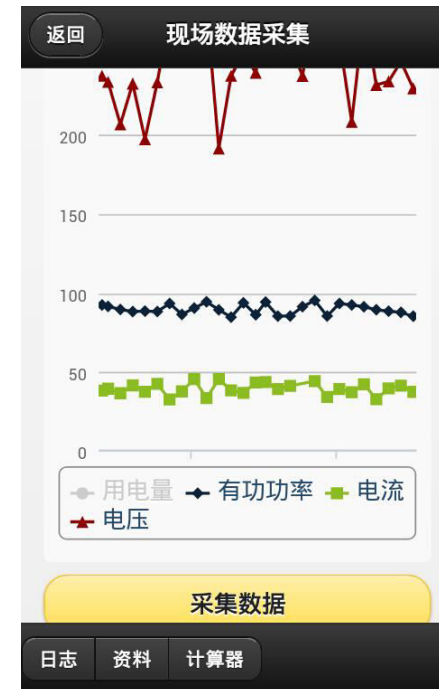
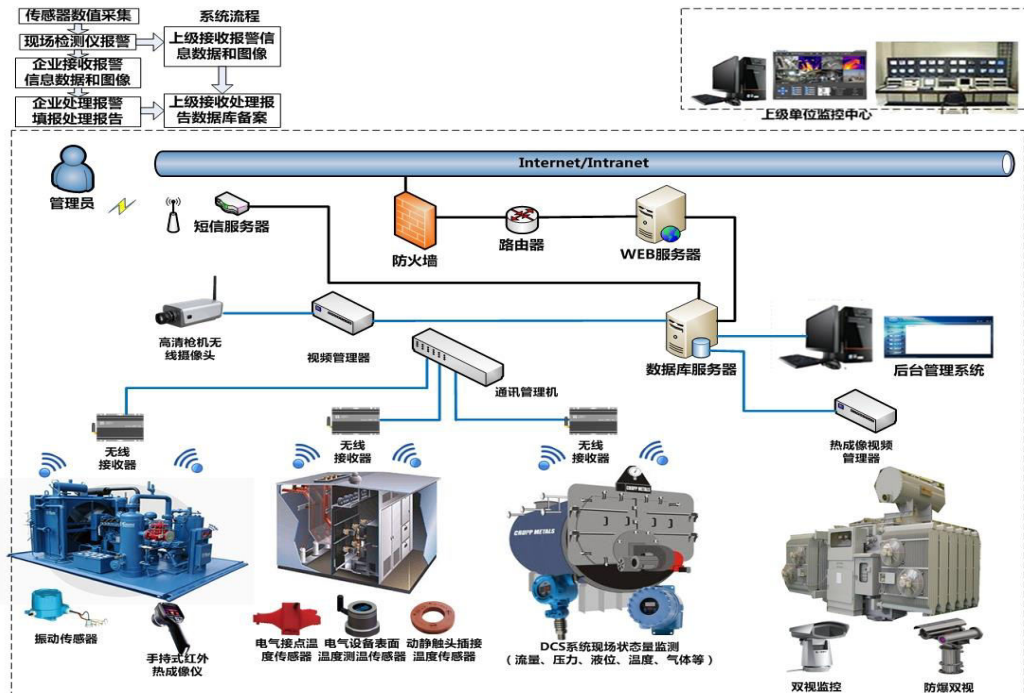
Smart inspecting

Smart data collection Real time, accurate, objective and autonomous



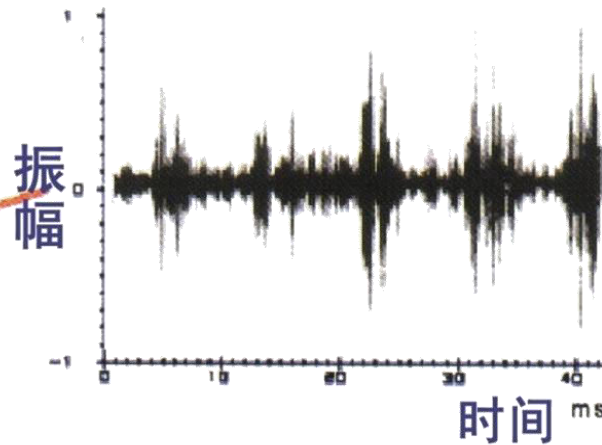
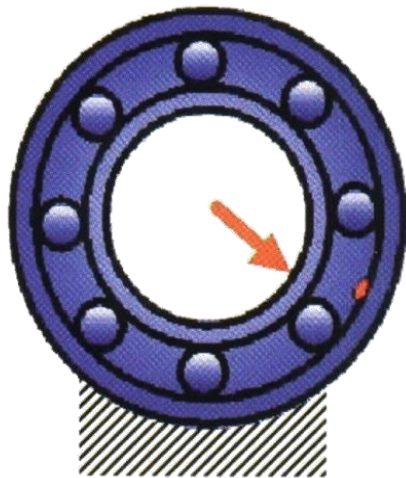
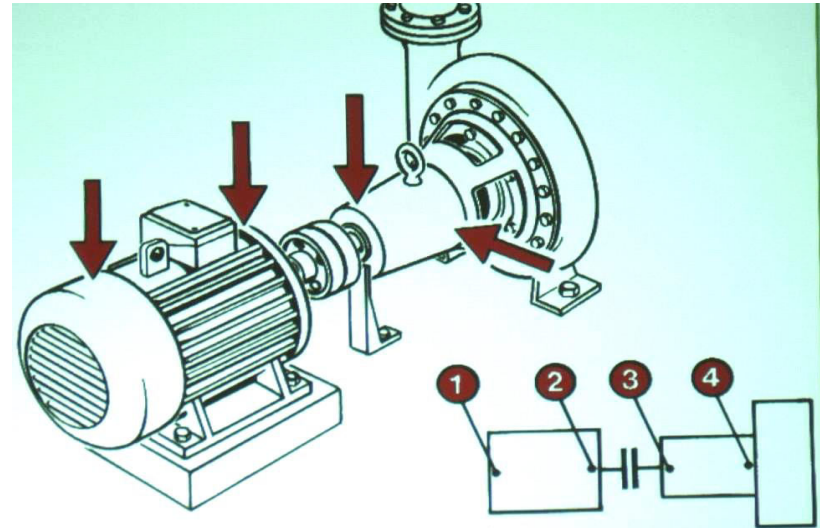
Smart inspecting

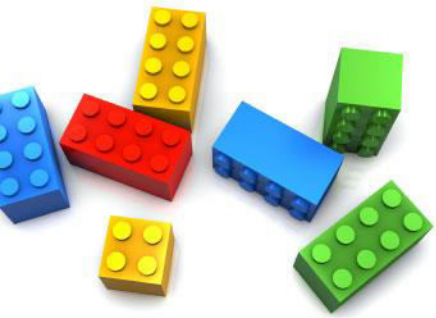
- Applying of PDA and condition based monitoring system in enterprises



Smart inspecting

- Vibration analysis

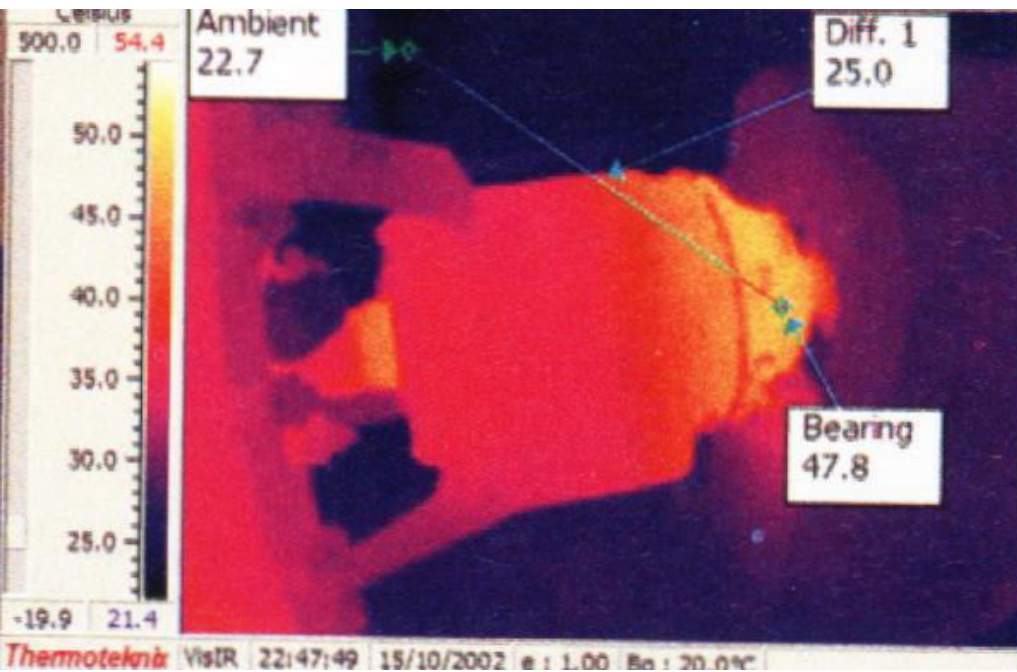


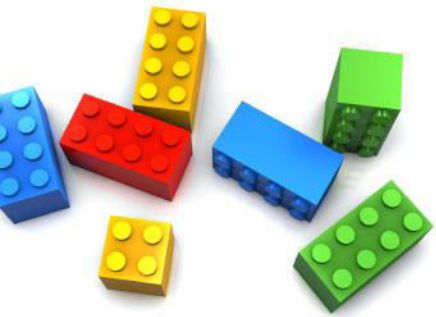


Smart inspecting



- Infrared analysis

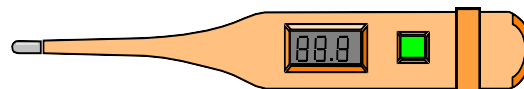
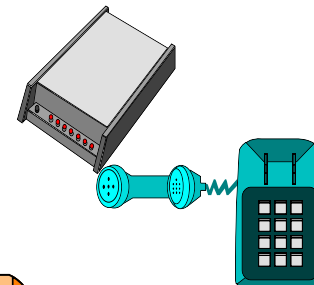
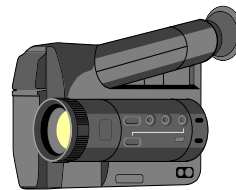
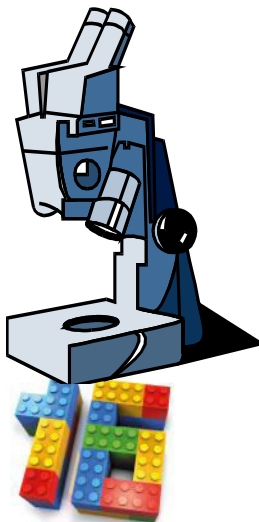
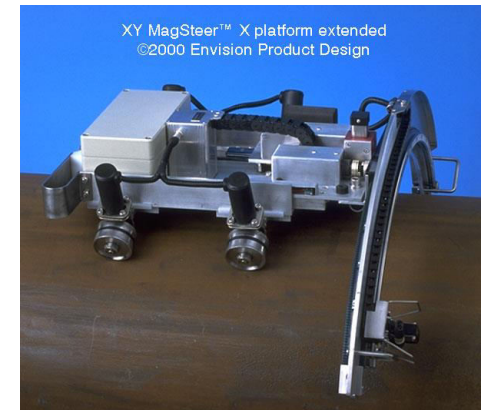




Smart inspecting

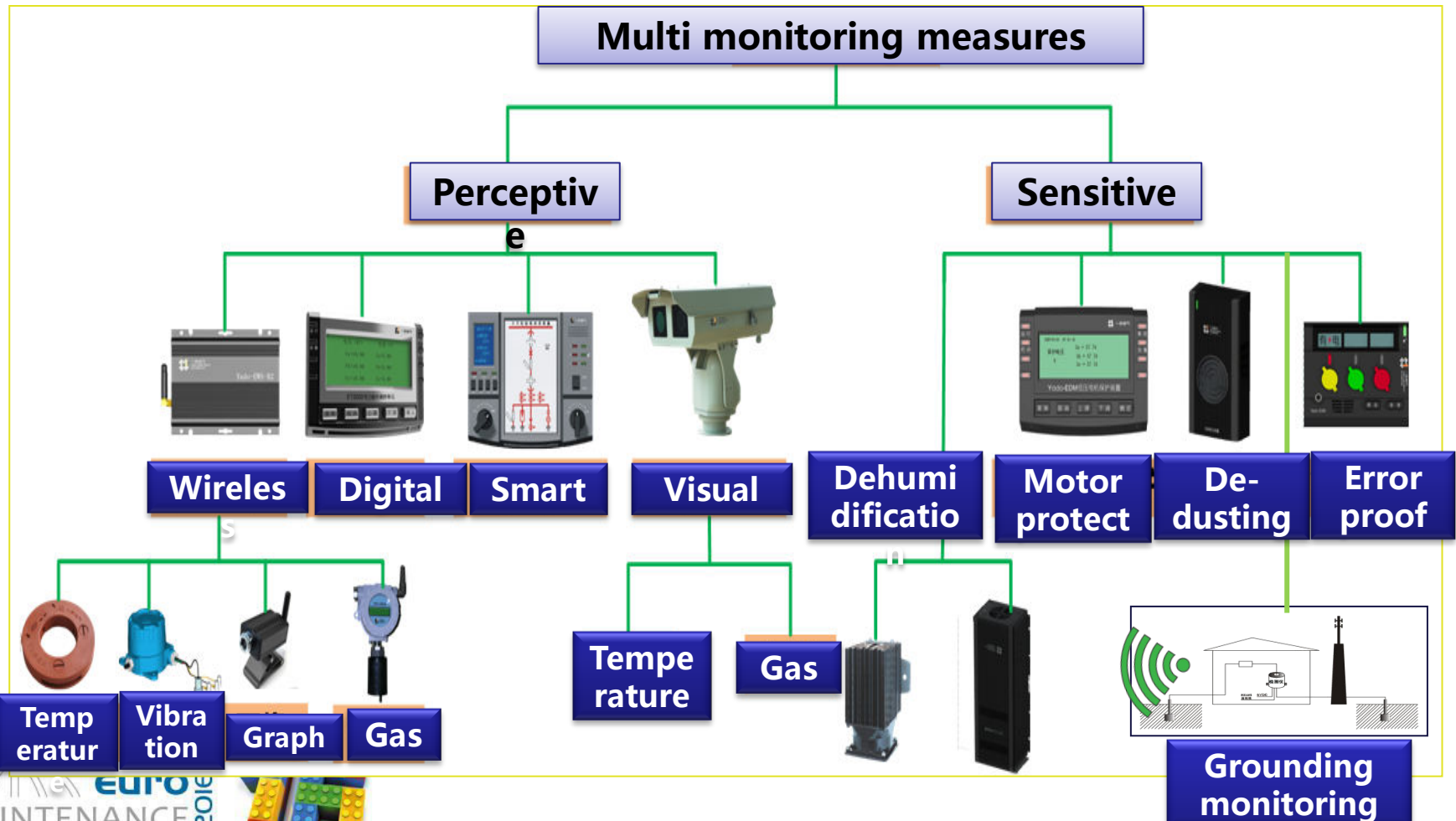


- Other instruments for analysis

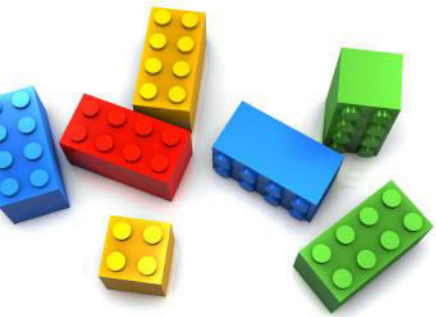


Smart inspecting

Multi-sensor system







Smart inspecting

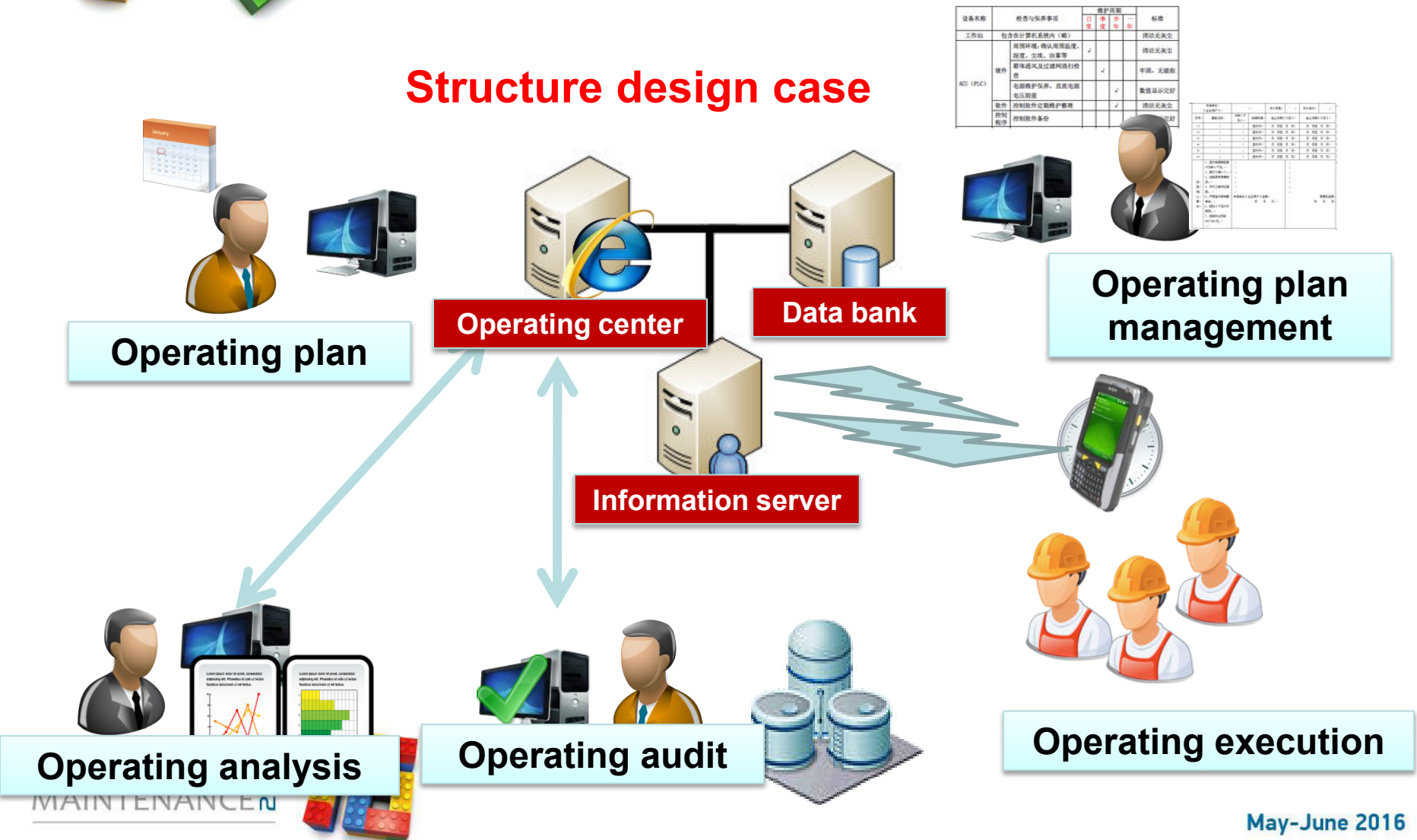


**Operator
inspection on
the shop-floor**

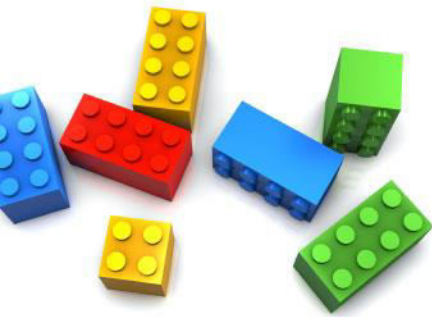


Smart inspecting

Structure design case



Smart inspecting



- Whole talkback

- Cooperative work

- Data interaction

- Multi media

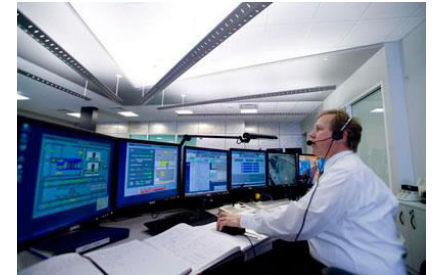
- Historic data

- Location-based service

- One key in rescue



Structure design case



Brief Introduction of smart maintenance

Smart maintenance strategy generation

Smart inspecting

Smart information managing

Smart analyzing & diagnosing

Smart knowledge managing

Interactive maintenance manual

Smart training & learning

Smart spare parts management

Smart integrated service

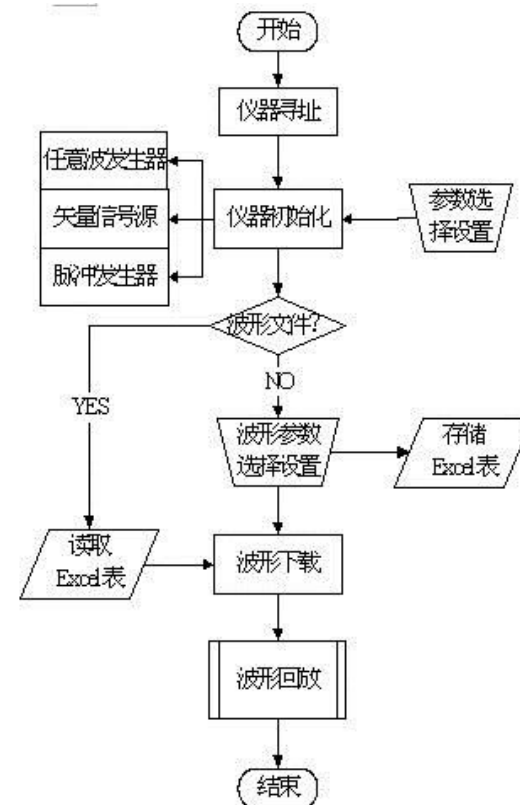
Internet + maintenance

Maintenance Robot

Smart information managing

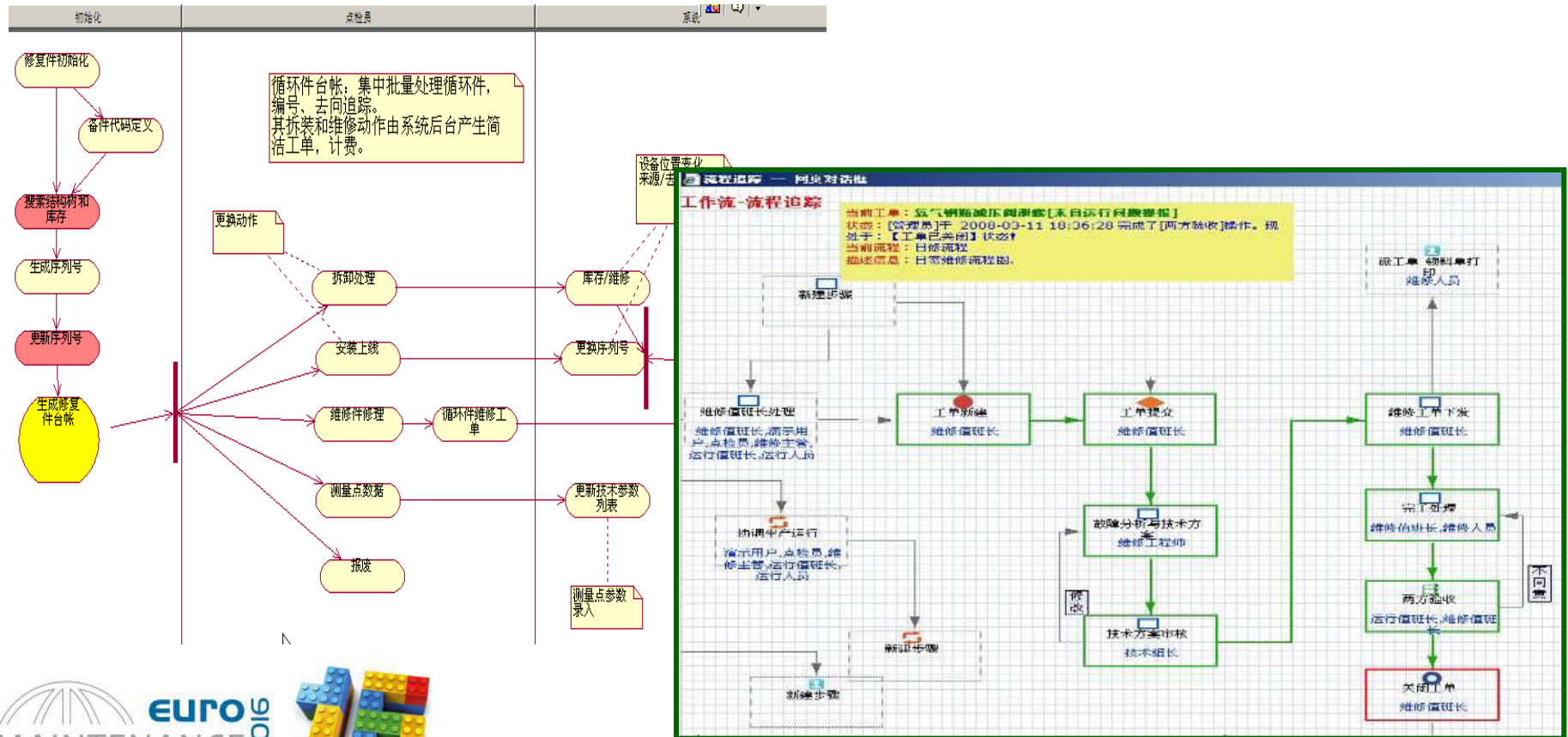
Definition

Material flow, value flow, capital flow as well as the **working flow** are all carried out by the assistant of internet.



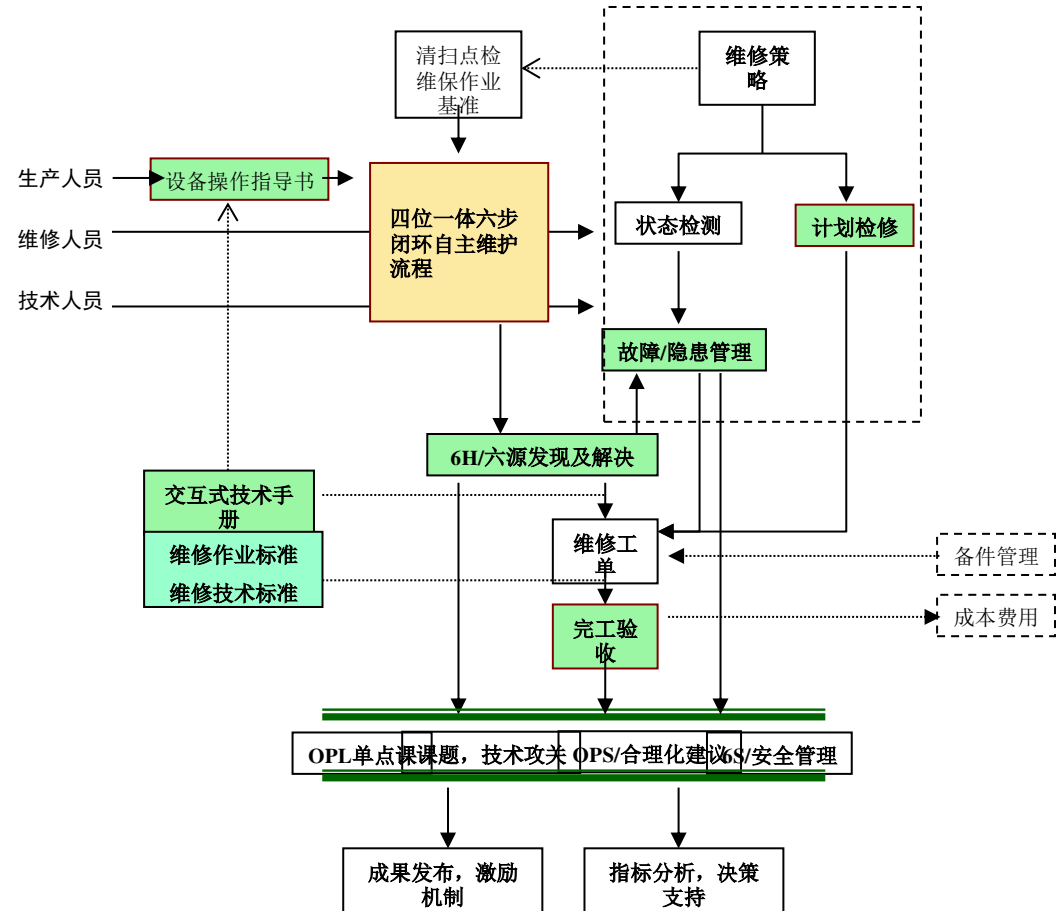
Smart information managing

Information flowing graphs

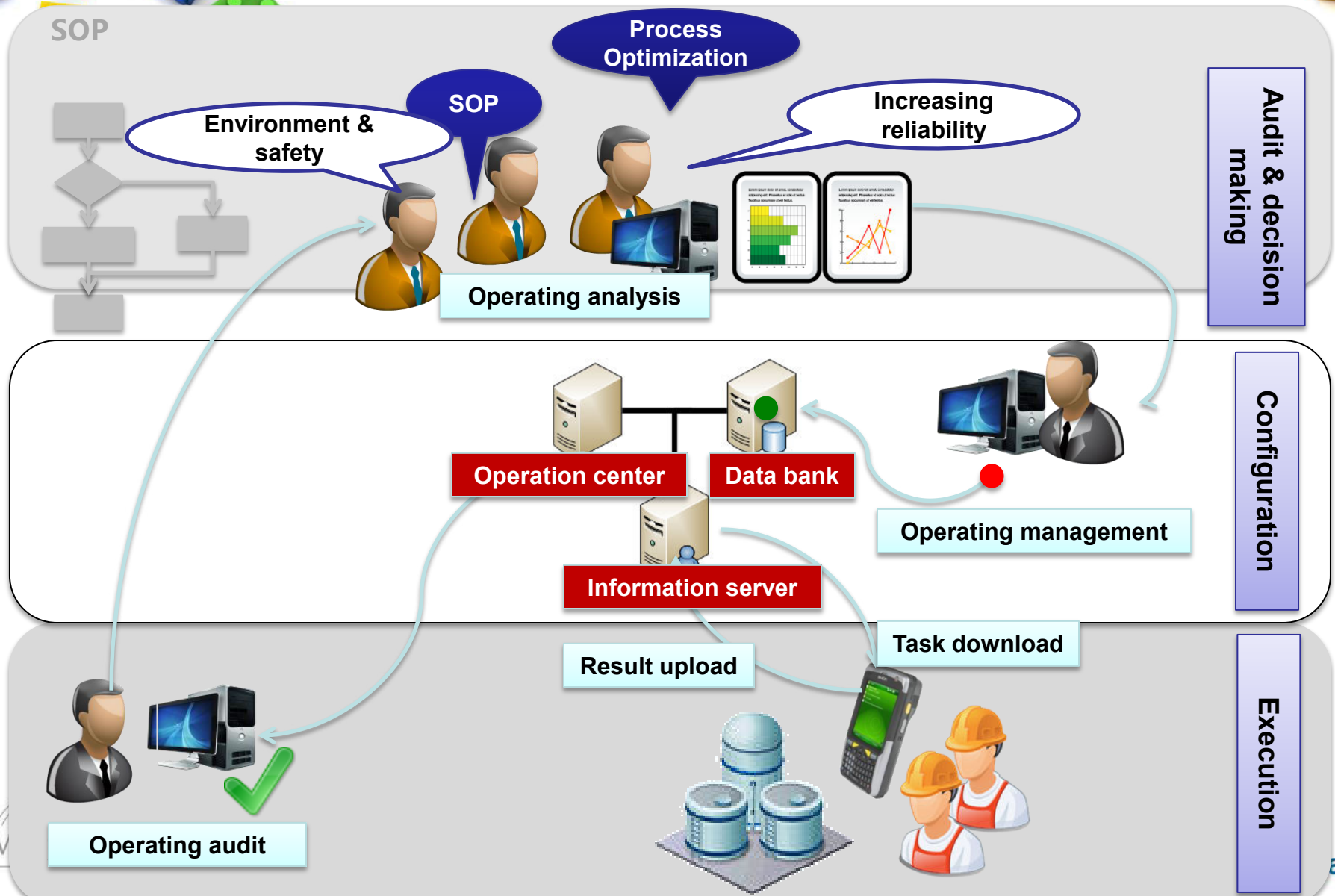


Smart information managing

Information flowing structure

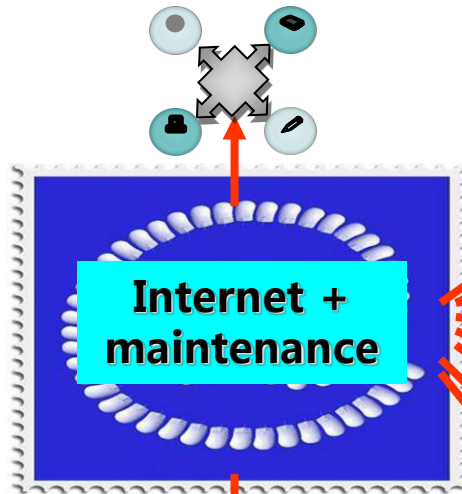


Smart information managing



Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot

Smart inspecting

Smart information managing

Smart analyzing & diagnosing

Smart knowledge managing

Interactive maintenance manual

Smart training & learning

Smart spare parts management

Smart integrated service



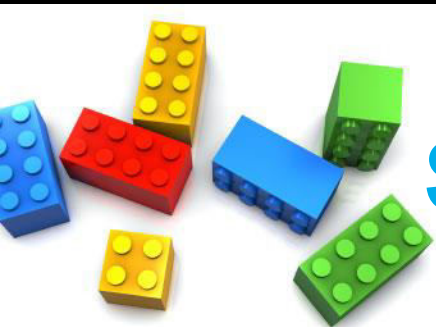


Smart analyzing & diagnosing

Definition

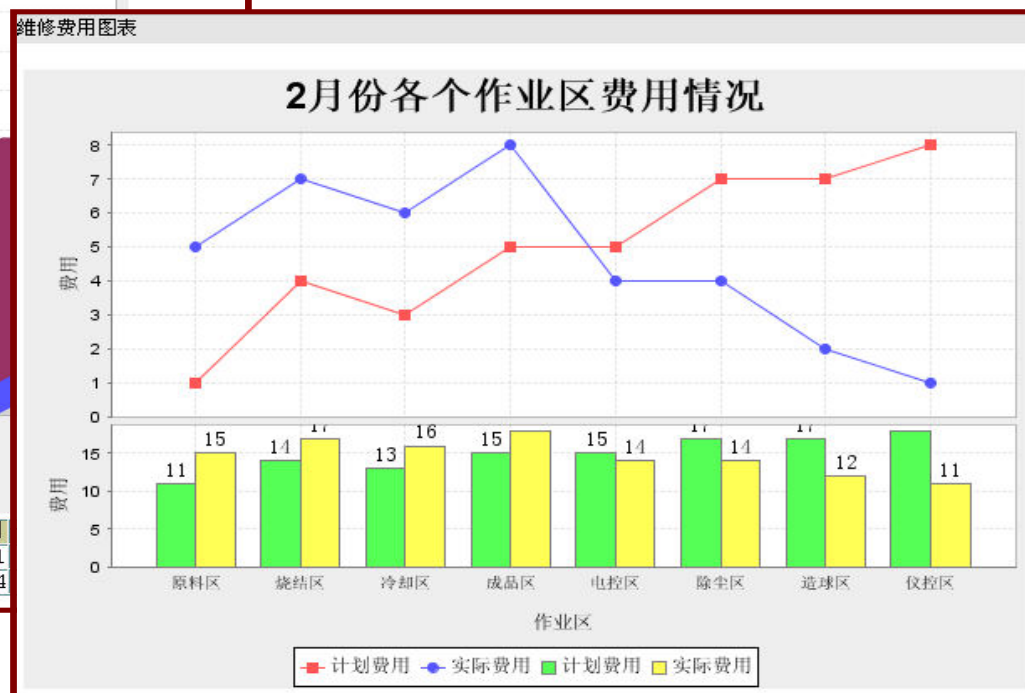
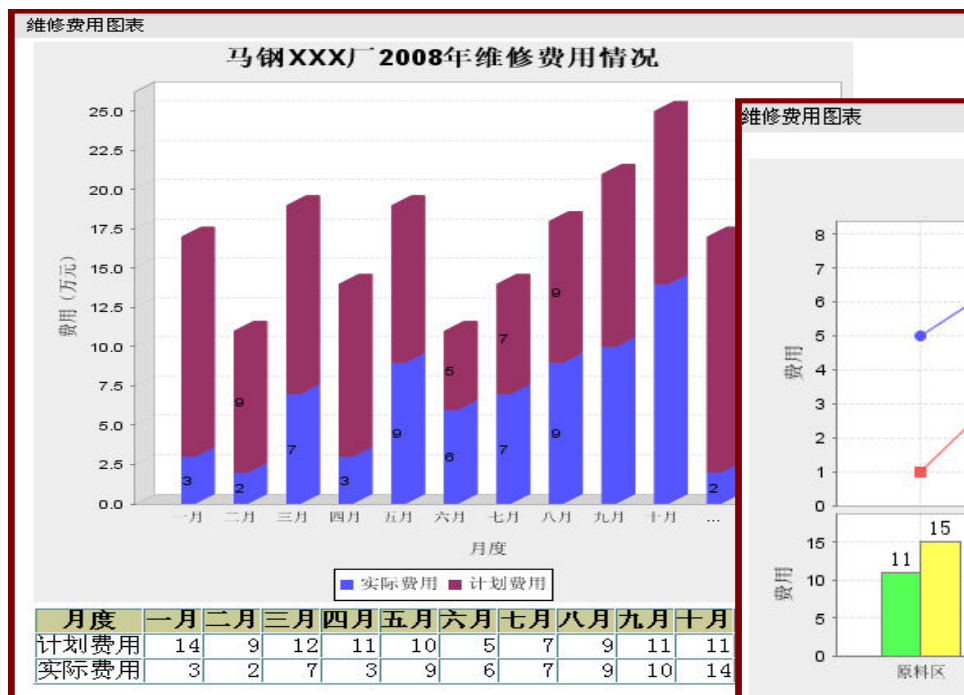
- Plant related big data analysis is carried out by internet so as to get the running status, maintenance condition, working efficiency, maintenance requirement, spare part requirement, lubrication requirement as well the maintenance technology requirement.
- Fault tree analysis, fault cause and effect analysis, cost analysis, fish-bone **analysis and diagnosis** will be generated automatically by the internet through big data analysis.

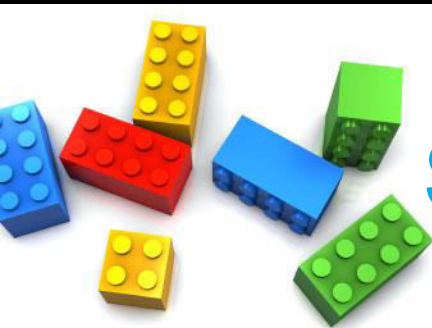




Smart analyzing & diagnosing

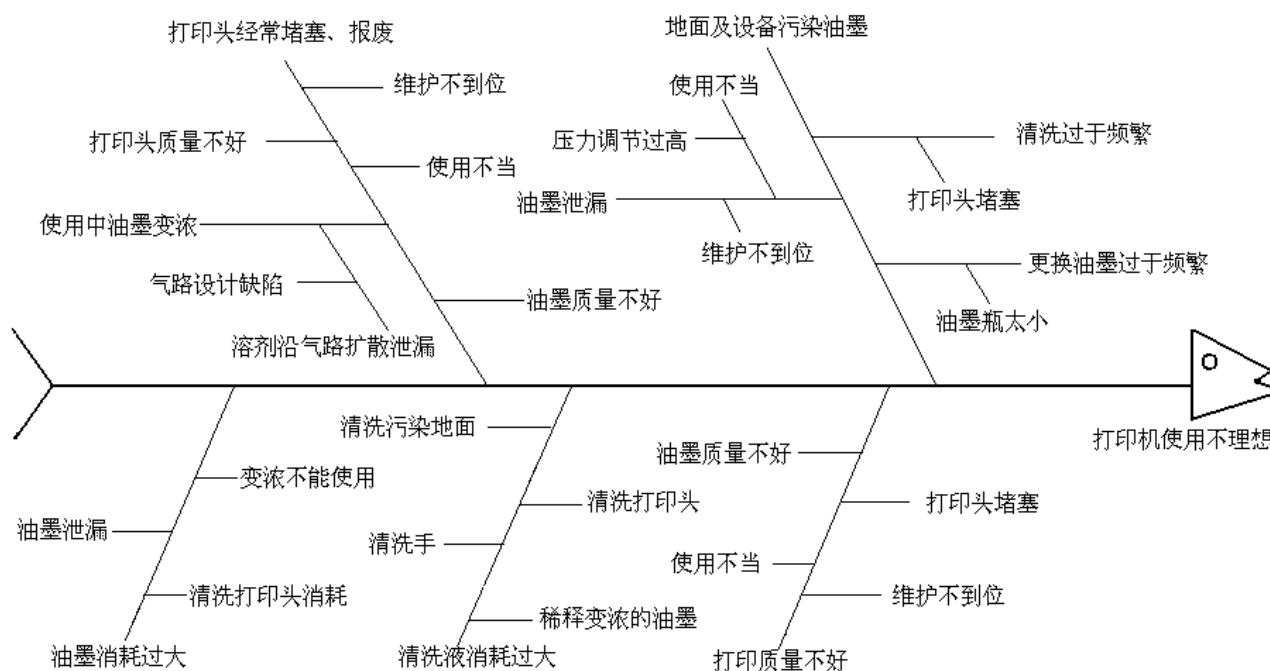
- Analysis with statistics data





Smart analyzing & diagnosing

Analysis with a generated fish bone

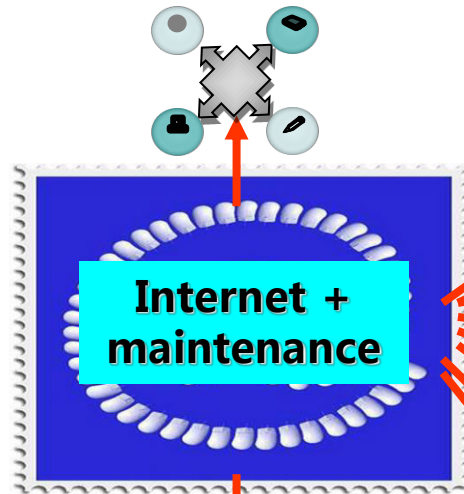


油墨打印系统使用不理想的原因分析鱼骨图



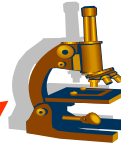
Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot

Smart inspecting



Smart information managing



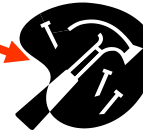
Smart analyzing & diagnosing



Smart knowledge managing



Interactive maintenance manual



Smart training & learning

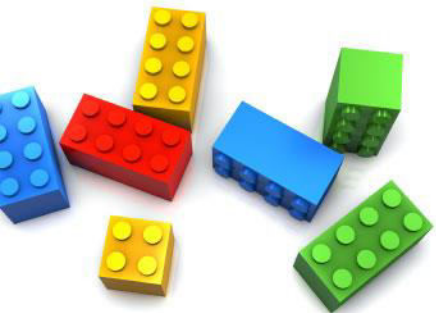


Smart spare parts management



Smart integrated service

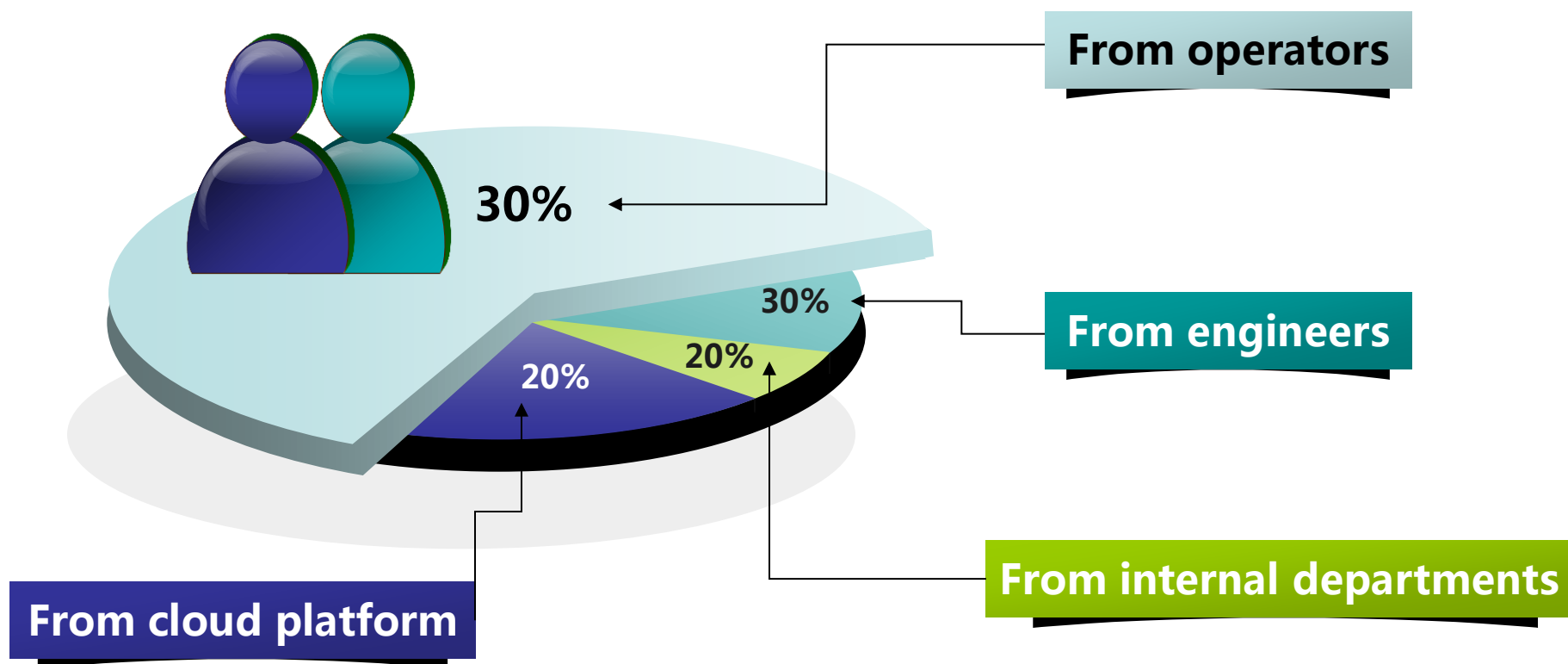




Smart knowledge managing

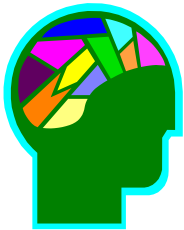


Four fields of knowledge management



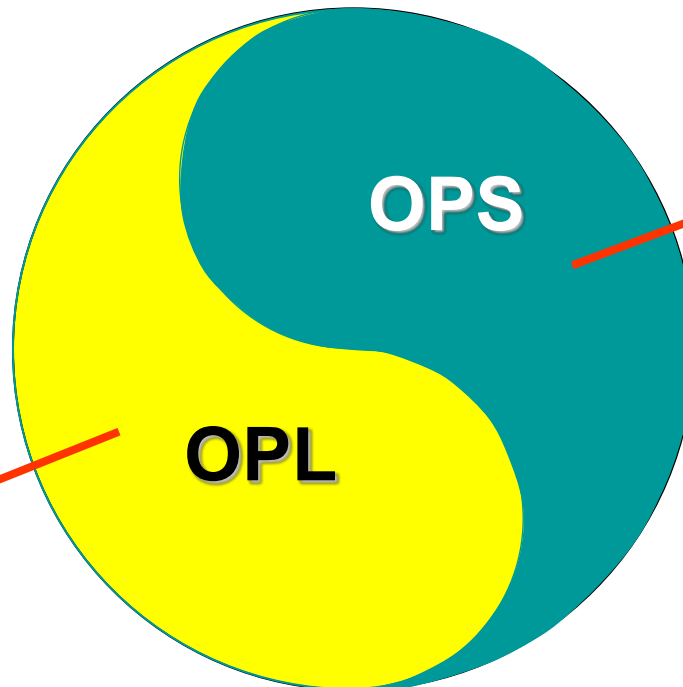
Smart knowledge managing

- Knowledge comes from the root employees



五线一点教育
Colgate Palmolive One Point Lesson

课程名称: 大盖密封点	课程日期: 2008.05.20	课程讲师: TSM Team & Operator
课程时间: 15分钟	课程地点: 大盖密封点	课程对象: 大盖密封点操作员
课程目标: 了解大盖密封点的结构、功能、使用方法和注意事项。		
课程内容: 1. 大盖密封点的结构、功能、使用方法和注意事项。2. 大盖密封点的维护保养。3. 大盖密封点的故障排除。		
课程总结: 大盖密封点是设备的重要组成部分，其结构、功能、使用方法和注意事项必须了解。大盖密封点的维护保养和故障排除是设备操作的重要内容。		
课程评价: 课程评价表		



Smart knowledge managing

- Knowledge comes from the engineers

图1 细油滤滤芯的拆卸和安装

滤芯的拆装更换

注意

只有在油滤堵塞（油滤指示器伸出）、液压系统污染或工作超过300小时，才更换滤芯。

1. 在2400部位机头附件板上，找到细油滤AR83-07-001，拧下下壳体（2）；
2. 卸下需更换的滤芯；
3. 如需要清洗下壳体；
4. 更换密封圈（3），（4），（5）；
5. 换上新的滤芯（1）；
6. 将下壳体拧到上壳体上（不要用扳手）；
7. 如果阻塞指示器已经顶出，轻轻将它按回原位。

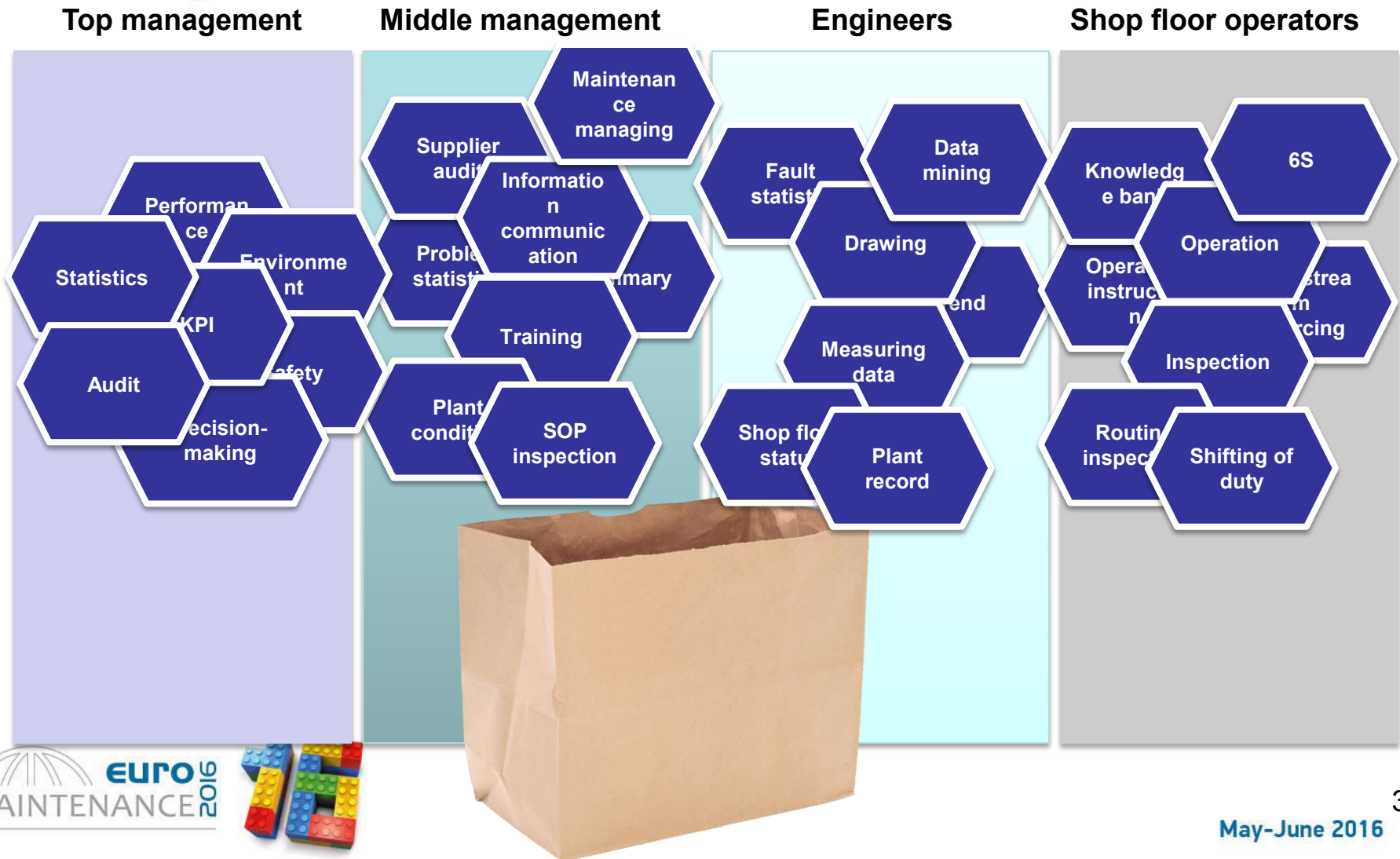
1 滤芯
2 壳体
3 密封圈
4 密封圈
5 密封圈

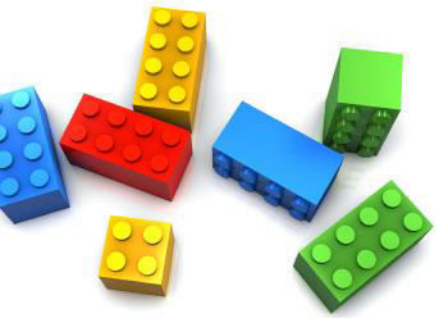
图1 细油滤滤芯的拆卸和安装



Smart knowledge managing

Knowledge from internal departments

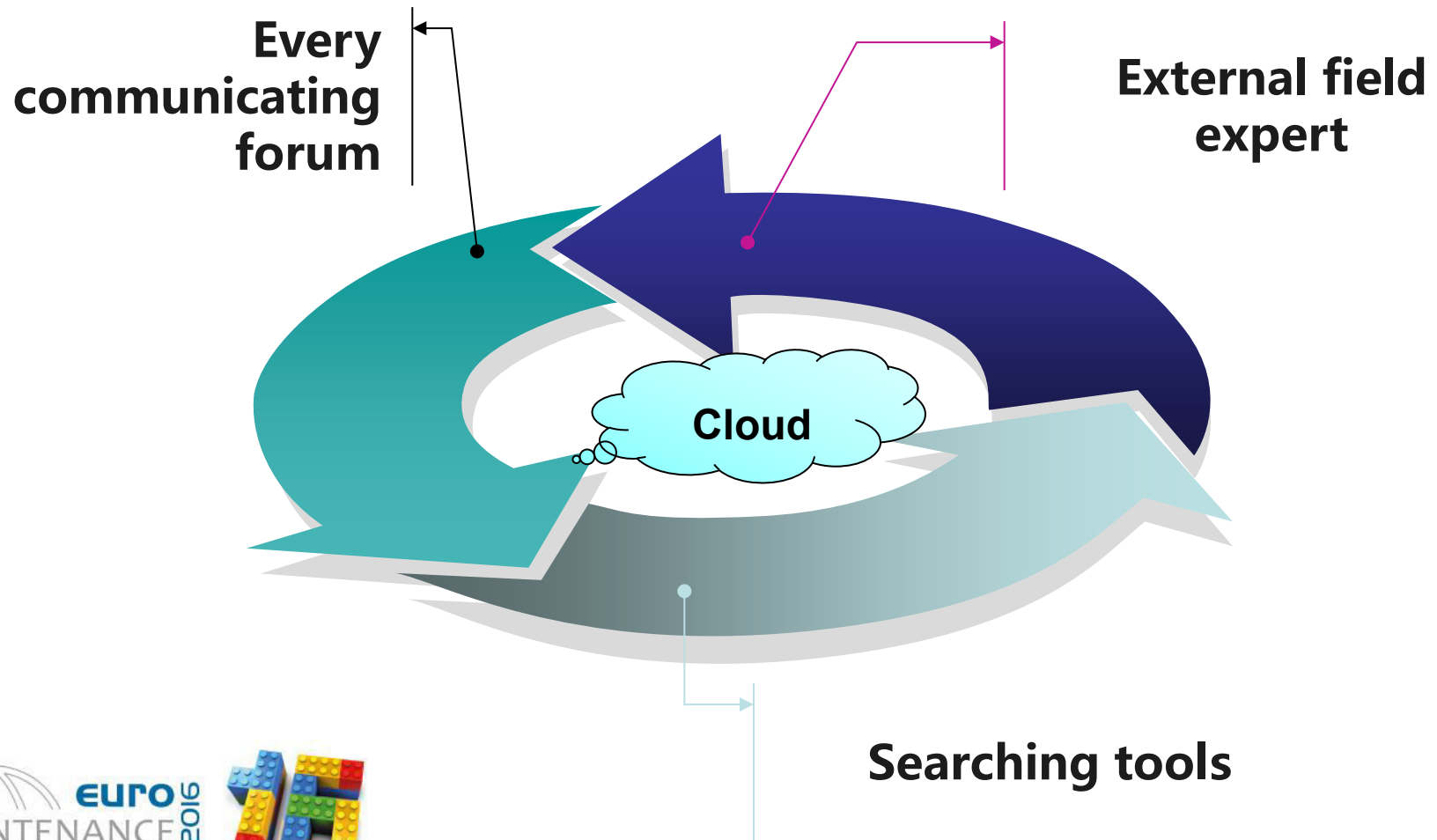




Smart knowledge managing

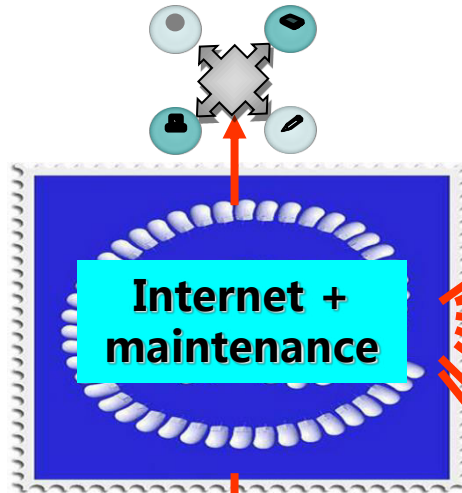


- Knowledge from cloud platform



Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot

Smart inspecting

Smart information managing

Smart analyzing & diagnosing

Smart knowledge managing

Interactive maintenance manual

Smart training & learning

Smart spare parts management

Smart integrated service





Drawing could be enlarged or downsized

全屏显示 | 前一张 | 后一张 | 关闭

手册封面

组成结构

组成分解结构

零件信息

设备操作规程

维修技术

检查维护

故障处理

动态设备信息

I 机列

II 机列

III 机列

IV 机列

V 机列

降温风机

机后升降台

循环水泵

单带辊道

拉钢机 (一)

拉钢机 (二)

10. 蜗轮箱

马钢热轧机维修技术手册

版本: 2.0

编制人: 王辉力 邵志刚 黄海生

修订时间: 20070802

审定: 马钢第一钢铁总厂 机修科

热轧工艺流程示意图

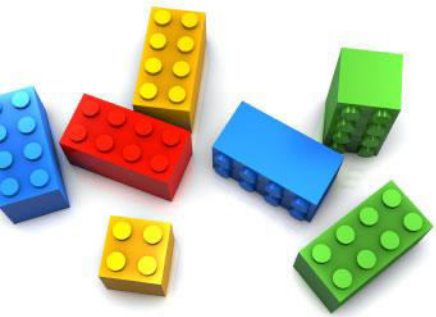
内容摘要:

本手册系统地介绍了二十项热轧机的类型、特点、结构、主要技术参数、工作原理、维护保养、故障处理、检修标准、以及热轧机的安全操作规程。本手册可作为热轧机生产维护、检修、设计、操作人员、工程技术人员、设计人员参考、使用。

http://162.1.1.73:8081

放大 | 缩小 | 正常显示 | 关闭

May-June 2016



smart maintenance manual



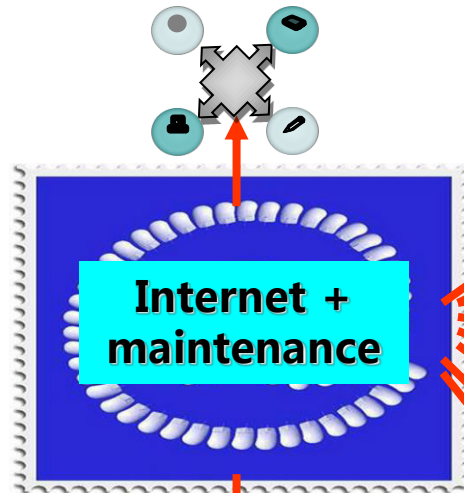
Video aided maintenance process



May-June 2016

Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot

Smart inspecting



Smart information managing



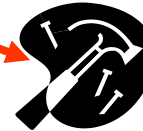
Smart analyzing & diagnosing



Smart knowledge managing



Interactive maintenance manual



Smart training & learning

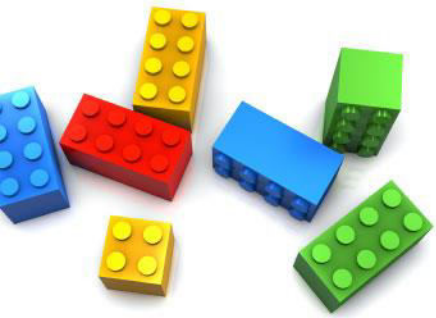


Smart spare parts management



Smart integrated service





Smart training & learning



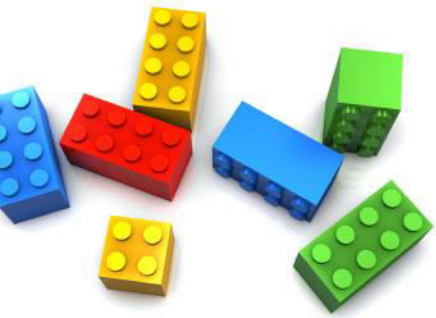
Definition

- smart learning is also called digital learning, network learning, or electronic learning come from different knowledge sources.

Features

- Cost saving, Time saving, Flexible.
(5A:anybody, any time, any place, any start point, any course)





Smart training & learning



E-Learning in Baosteel

- 1 Introduction
- 2 Registration
- 3 On line learning
- 4 On line homework and examination
- 5 Personnel information
- 6 Questions and answers



Smart training & learning

smart training & learning in Baosteel

BAOSTEEL 宝钢集团

学员主页 student

学员主页 切换地点 社区 注销

欢迎您：宝钢分公司用户

站点公告 系统运行公告 (2009-05-08) 宝钢人才开发院5月份网络培训新开班计划 (2009- MORE >

我的课程 MORE >

开始学习	课程信息	培训项目	类别	开始时间	结束时间	学时	课程中心	收藏夹	课件下载
	宝钢综合管理体系概论	管理员专项		2008-10-30	2009-12-31	8	进入	未收藏	无
	宝钢设备点检定修制	管理员专项		2008-10-30	2009-12-31	8	进入	未收藏	无
	宝钢生产工艺	管理员专项		2008-10-30	2009-12-31	24	进入	未收藏	无
	宝钢钢铁产品	管理员专项		2008-10-30	2009-12-31	8	进入	未收藏	无
	会计基础	宝钢财务知识培训		2009-05-15	2009-08-15	12	进入	未收藏	无

新课推荐 MORE >

选课	课程信息	培训项目	类别	开始时间	结束时间	学时	收藏夹	学习方式
	家庭小药箱与健康	文化素养		2009-04-01	2010-12-31	4	未收藏	在线
	数码摄影基础知识	文化素养		2009-04-01	2010-12-31	4	未收藏	在线
	摄影技术技法	文化素养		2009-04-01	2010-12-31	4	未收藏	在线
	中国书法欣赏、收藏及基础知识	文化素养		2009-04-01	2010-12-31	4	未收藏	在线
	古代名画——屈原	文化素养		2009-04-01	2010-12-31	4	未收藏	在线

BAOSTEEL 宝钢集团

学员主页 student

学员主页 切换地点 社区 注销

欢迎您：宝钢分公司用户

作业考试

类型：☐ 作业 ☒ 考试

对应课程名称： SEARCH >

开始考试	考试	课程信息	培训项目	开始时间	结束时间
	《宝钢综合管理体系概论》考试	宝钢综合管理体系概论	管理员专项	2008-10-30 00:00	2009-12-31 23:59
	《宝钢设备点检定修制》考试	宝钢设备点检定修制	管理员专项	2008-10-30 00:00	2009-12-31 23:59
	《宝钢生产工艺》考试	宝钢生产工艺	管理员专项	2008-10-30 00:00	2009-12-31 23:59
	《宝钢钢铁产品》考试	宝钢钢铁产品	管理员专项	2008-10-30 00:00	2009-12-31 23:59
	《初级日语》考试	初级日语	管理员专项	2008-10-30 00:00	2009-12-31 23:59
	《绩效管理》考试	绩效管理	BS-D任职资格培训	2009-05-01 00:00	2009-12-31 23:59
	《企业规范化管理》考试	企业规范化管理	BS-D任职资格培训	2009-05-01 00:00	2009-12-31 23:59
	《Server2003初级管理教程》考试	Server2003初级管理教程	2009年计划培训项目	2009-04-16 00:00	2009-08-12 23:59
	《Windows XP操作系统》考试	Windows XP操作系统	2009年计划培训项目	2009-04-16 00:00	2009-08-12 23:59
	《精益生产之JIT实务》考试	精益生产之JIT实务	2009年计划培训项目	2009-04-20 00:00	2009-07-17 23:59

当前第1页共13页 上一页 下一页 跳转到

BAOSTEEL 宝钢集团

学员主页 student

学员主页 切换地点 社区 注销

欢迎您：宝钢分公司用户

作业考试

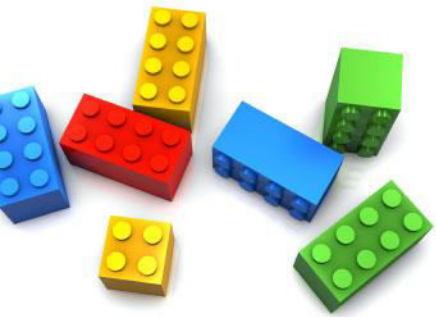
类型：☒ 作业 ☐ 考试

线上作业 MORE >

写作业	作业	课程	开始时间	结束时间
	《宝钢综合管理体系概论》作业	宝钢综合管理体系概论	2008-10-30	2009-12-31
	《宝钢设备点检定修制》作业	宝钢设备点检定修制	2008-10-30	2009-12-31
	《宝钢生产工艺》作业	宝钢生产工艺	2008-10-30	2009-12-31
	《宝钢钢铁产品》作业	宝钢钢铁产品	2008-10-30	2009-12-31
	《初级日语》作业	初级日语	2008-10-30	2009-12-31

线下作业 MORE >

写作业	作业	课程	开始时间	结束时间	作业批改
	网络CAD第三次作业-2.dwg	AutoCAD基础应用	2008-10-15	2009-12-18	未批改
	网络CAD第三次作业-1.dwg	AutoCAD基础应用	2008-10-15	2009-12-18	未批改
	网络CAD第二次作业-2.dwg	AutoCAD基础应用	2008-10-15	2009-12-18	未批改
	网络CAD第二次作业-1.dwg	AutoCAD基础应用	2008-10-15	2009-12-18	未批改
	网络CAD第一次作业-3.dwg	AutoCAD基础应用	2008-10-15	2009-12-18	未批改



Smart training & learning



American army on line learning system

American Army On-line Courses

The screenshot displays the GoArmyEd website, which serves as the virtual gateway for Soldiers on active duty to request Tuition Assistance (TA) online, anytime for classroom, distance learning, and eArmyU online college courses. The website features a navigation menu on the left with links to Home, Tuition Assistance (TA) Policies, Earn a Degree or Credential, Programs and Services, Money for College, GoArmyEd, eArmyU, College of the American Soldier, and Help. The main content area includes a large banner with the GoArmyEd logo and a central image of a laptop displaying the website. Below the banner, there is a section titled 'About GoArmyEd' which describes the system as a dynamic online portal that automates many of the paper-based processes Soldiers historically conducted with their Army education counselor. It also lists the users of the system: Soldiers to pursue their postsecondary educational goals, Army education counselors to provide educational guidance, and Colleges to deliver degree and course offerings and to report Soldier progress. The right sidebar contains a 'GoArmyEd Log In' section with fields for Registered Users Log In Username and Password, a 'Go' button, and links for 'Forgot your username and/or password?' and 'Pop-up blocker help'. Below this is an 'About ACES' section, which states that GoArmyEd is the gateway to all Army Continuing Education System (ACES) programs and services, with a link to 'Learn About ACES'. At the bottom right is a 'CAS' section, which identifies the College of the American Soldier (CAS) as the Career NCO's link to higher learning and maximum credit for military training, with a link to 'Learn About CAS'. The footer includes a copyright notice and links to Accessibility Statement, Privacy Act, Helpdesk, and Status.

GoArmyEd
Welcome to GoArmyEd! [New Users](#) / [Helpdesk](#)

Home
Tuition Assistance (TA) Policies
[] Earn a Degree or Credential
[] Programs and Services
[] Money for College
[] GoArmyEd
[] eArmyU
College of the American Soldier
[] Help

Welcome to GoArmyEd - Tuition Assistance

GoArmyEd Log In
Registered Users Log In
Username:
Password:

[Forgot your username and/or password?](#)
[Pop-up blocker help](#)

About ACES
GoArmyEd is the gateway to all Army Continuing Education System (ACES) programs and services.
[Learn About ACES](#)

CAS

College of the American Soldier (CAS) is the Career NCO's link to higher learning and maximum credit for military training.
[Learn About CAS](#)

News And Announcements
Sergeant in Iraq earns more "stripes"
By Meghan Gilbert
Blade Staff Inter
U.S. Army Staff Sgt. James Trent finishes what he starts.
Go W. [More](#)

About GoArmyEd

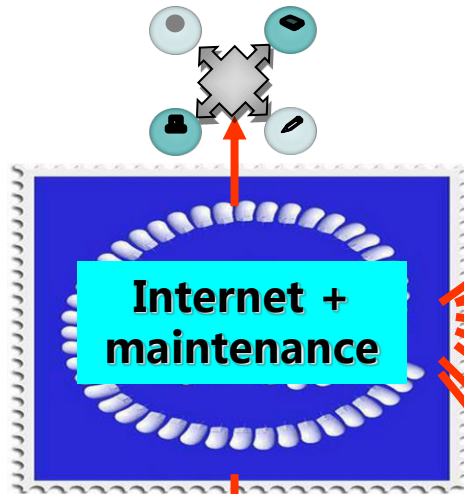
GoArmyEd is the virtual gateway for Soldiers on active duty to request Tuition Assistance (TA) online, anytime for classroom, distance learning, and eArmyU online college courses.
GoArmyEd is a dynamic online portal that automates many of the paper-based processes Soldiers historically conducted with their Army education counselor.
GoArmyEd is used by:
• Soldiers to pursue their postsecondary educational goals
• Army education counselors to provide educational guidance
• Colleges to deliver degree and course offerings and to report Soldier progress
[Learn About GoArmyEd](#)

© Copyright

Accessibility Statement | Privacy Act | Helpdesk | Status

Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot

Smart inspecting

Smart information managing

Smart analyzing & diagnosing

Smart knowledge managing

Interactive maintenance manual

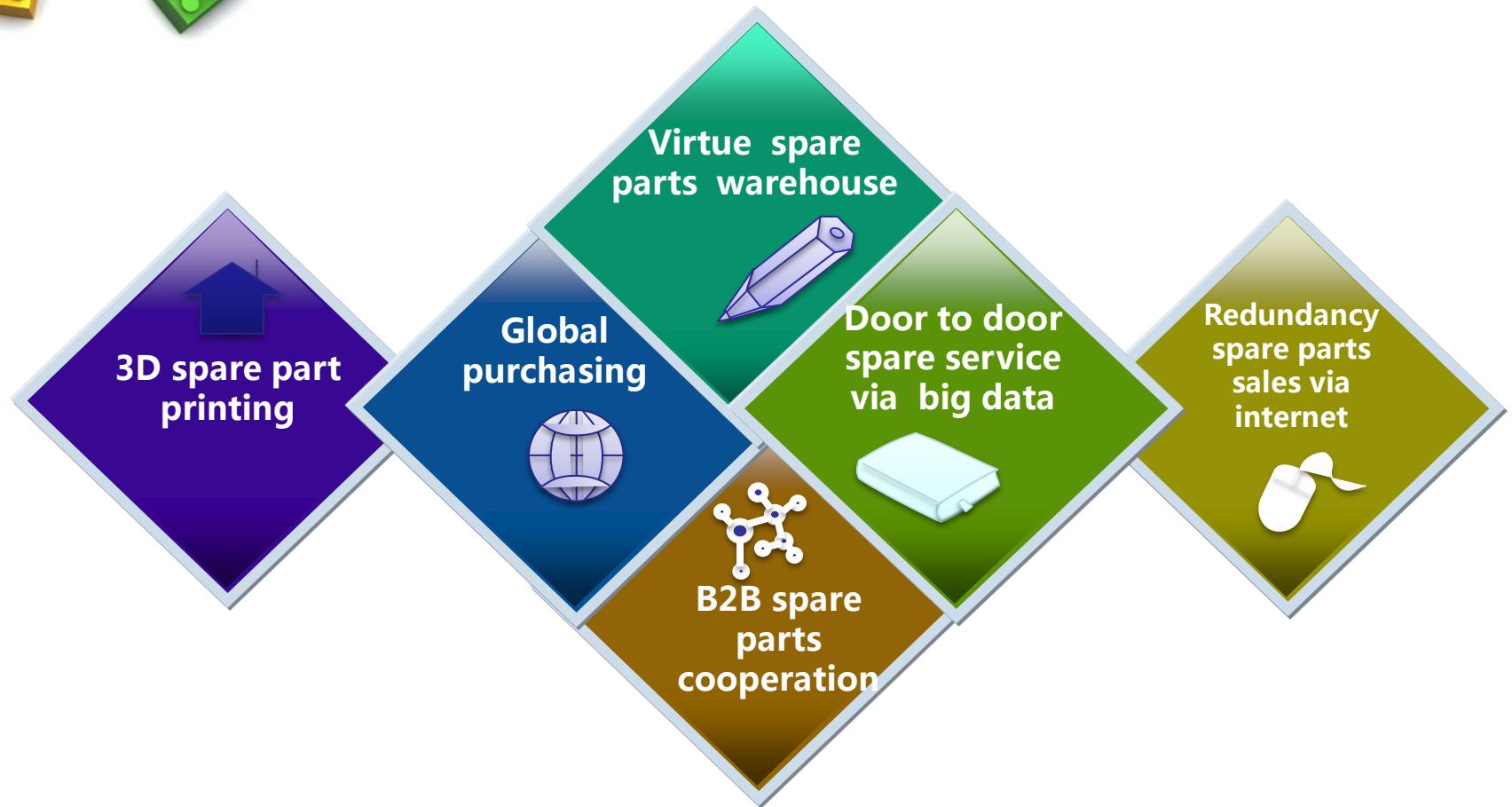
Smart training & learning

Smart spare parts management

Smart integrated service

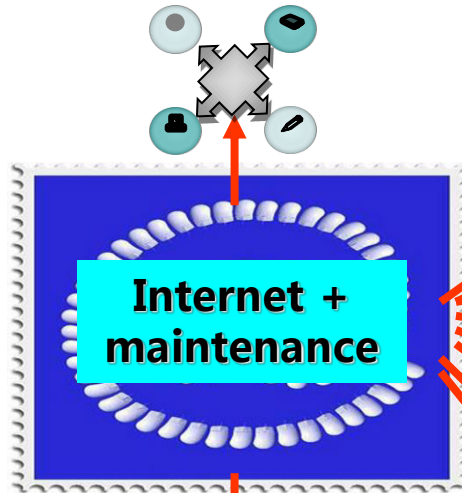


Smart spare parts management

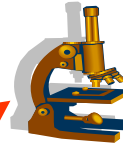


Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot



Smart inspecting



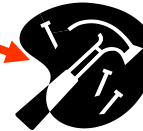
Smart information managing



Smart analyzing & diagnosing



Smart knowledge managing



Interactive maintenance manual



Smart training & learning



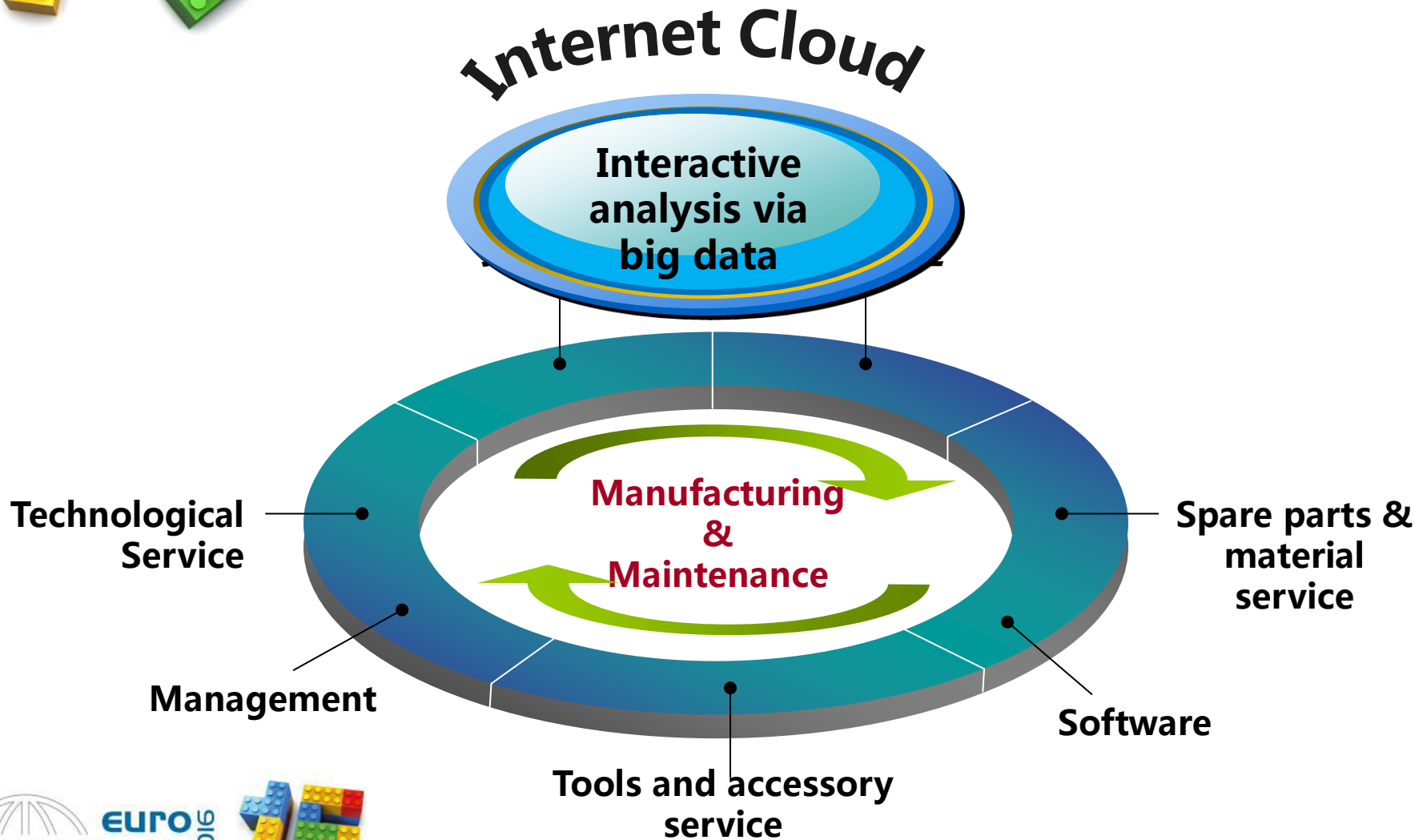
Smart spare parts management



Smart integrated service

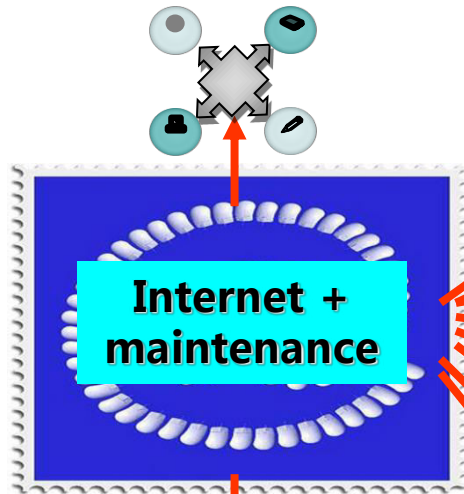


Smart integrated service

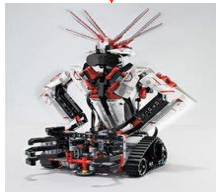


Brief Introduction of smart maintenance

Smart maintenance strategy generation



Maintenance Robot



Smart inspecting



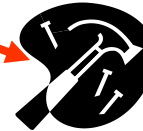
Smart information managing



Smart analyzing & diagnosing



Smart knowledge managing



Interactive maintenance manual



Smart training & learning

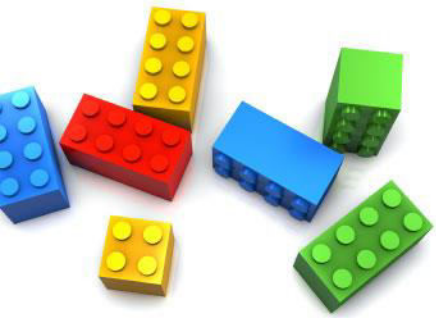


Smart spare parts management



Smart integrated service





Background



- **Deficiency of industrial workers !**
- **Much more deficiency of maintainers!**
- **Increasing of labor cost !**
- **Dangerous, miserable maintenance circumstances!**
- **Decreasing cost of Robots!**



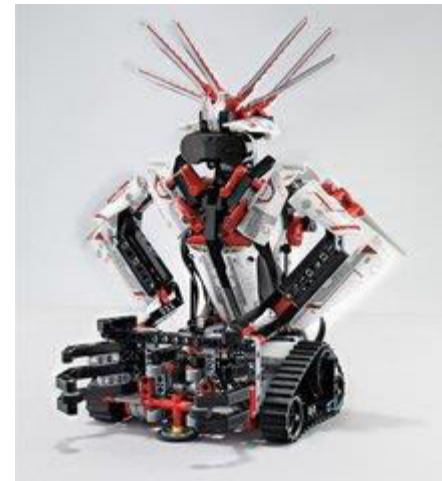
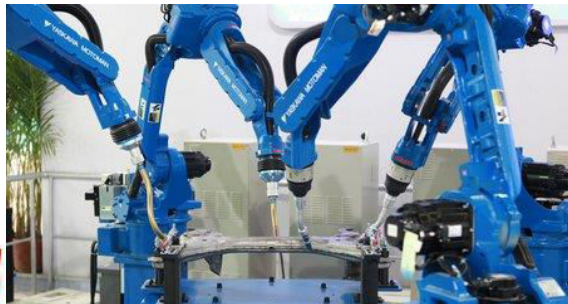
Main Domains of Robot Maintenance

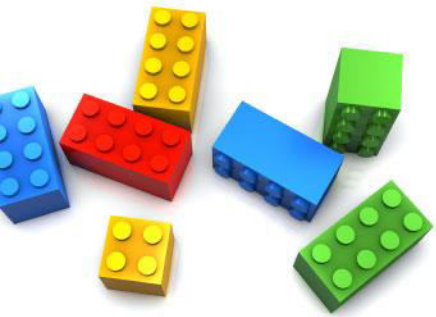
**Main domains of
Robot Maintenance**

Smart inspecting

Smart maintaining

Smart fitting and calibrating





Main fields of Robot Maintenance



**Aviation
Space flight
High speed trains**

**Self
diagnosis
calibrating
maintaining**

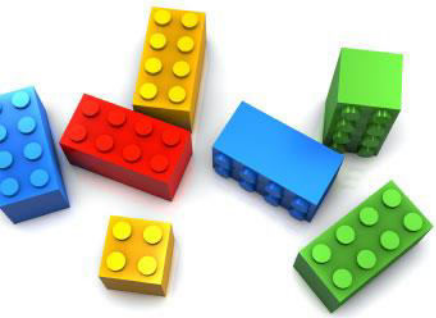
**Nuclear
facility
Military
weapon**

**Radioactive
Weapon
inspecting
and repair**

**Other
high
Dangerous
task**

**High
polluting
noising
altitude
operating**

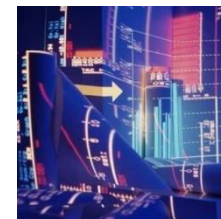
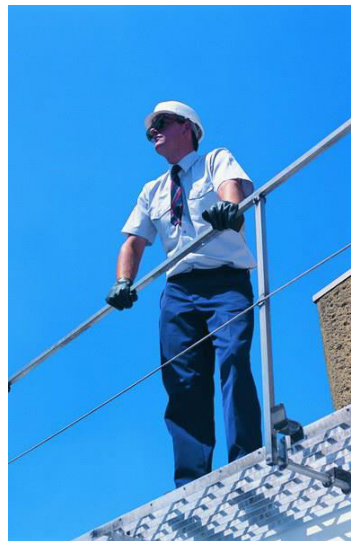




Concluding Remarks



- smart maintenance will never break away from human maintenance activities;
- Both smart maintenance and human maintenance will be growing together;
- smart maintenance is the inevitable trend of maintenance development in the future;
- Are you ready to the coming of smart maintenance era?





www.tnpm.org

Thank you!
Questions & Answers

shflibaowen@163.com
www.tnpm.org