Implementation of a SAP System for Managing Occupational Health and Hygiene Information.

Joanne Garrad

Business Systems Coordinator – Health and Hygiene

BHP Billiton Mitsubishi Alliance (BMA) Coal

ABSTRACT

BMA currently monitors the health of its employees in accordance with legal and where possible business requirements. BMA have implemented the SAP* module for Occupational Health. The objective of the Occupational Health Rollout project is to standardise Occupational Health business processes across BHP Billiton using the SAP Occupational Health Module as the enabler. The project is a corporate HSEC initiative and it requires the involved assets to determine the gap between their current processes and supporting systems and the global standard so as to manage the change at their asset. The following benefits will be realised by BMA from the implementation of the BHP Billiton global SAP Occupational Health solution:

- Standardisation of Occupational Health business processes across BMA assets.
- Single application for all Occupational Health data.
- Capacity for reporting and analysis across the business.
- Improve the ability to manage and audit the workforce's CMWHS attendance status.
- Provide the functionality for consistent management of role-based surveillance.
- Introduction of auditable information security to ensure the appropriate level of access for health and medical staff
- Reinforcement of the governance model for health systems.
- Long term integration of health and hygiene data.

This is an opportunity for BMA to standardise Occupational Health processes and create the foundations to implement additional functionality as legislation changes or as BMA health programs are extended. We believe we are breaking new ground in the management of occupational health data. The next step for BMA is the implementation of the SAP Hygiene module. The following benefits will be realised by BMA:

- Standardisation of process and tools for Hygiene across BHP Billiton
- Hygiene risk identification through system of proactive hygiene management and integration with the Health Module
- Reporting, trending and analysis capabilities across the business
- Knowledge sharing across assets of hygiene program outcomes.
- Long term integration of health and hygiene data for epidemiological study.
- Maintenance and continuity of corporate knowledge - reduce risks of standalone systems
- Reduction in duplication of data and increase in data integrity.
- Greater management of Hygiene monitoring cycle: planning, action, quantification - through to review
- Observation of effectiveness of implemented controls and progress on targets
- HR Link for movement of personnel – ability to maintain all exposure information

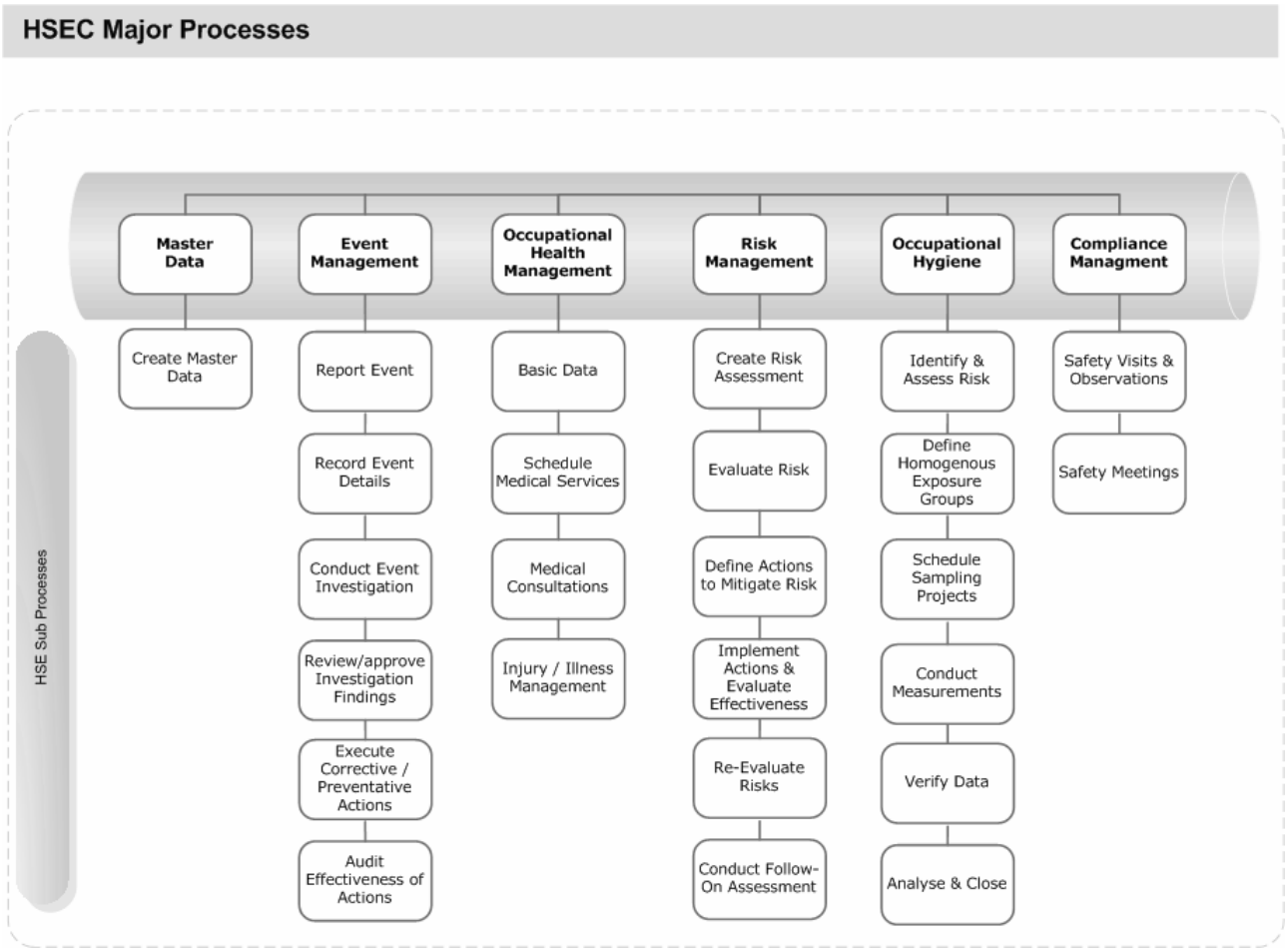
INTRODUCTION

In 2002 BHP Billiton introduced a guideline for Health Exposure Assessment. This document and other supporting documents were released as a result of a review conducted within parts of the organisation which showed that despite 30 years of hygiene monitoring activity, there was little data that could be salvaged or utilised from previous work. There were three reasons for this: the data had been collected in a reactive fashion primarily due to complaints about work areas, meaning that statistical analysis was next to impossible. The data collected was incomplete or lost due to lack of a system for collating and keeping the data. It had resided on paper or files on an individual's hard drive which was often lost when that individual left the business. Finally, with each new hygienist entering the business a new monitoring campaign was usually commissioned. [1]

As a result of having little data and little significant analysis, the ability to predict and prevent illness and disease as a result of workplace exposures was left wanting. This year, BHP Billiton have embarked on a global corporate drive to implement a common system which breaks new ground in the management of hygiene data and health outcomes for our business. The implementation of these modules has created an opportunity for BHP Billiton to standardise occupational health and hygiene processes and create the foundations to implement additional functionality as legislation changes or as health programs are extended.

Within BMA, the Health Module "went live" in April 2008. The Hygiene Module is due to "go live" in October 2008. Figure 1 illustrates where the health and hygiene modules fit within the major health and safety business processes.

FIGURE 1 HEALTH SAFETY ENVIRONMENT AND COMMUNITY MAJOR BUSINESS PROCESSES



IMPLEMENTATION OF THE OCCUPATIONAL HEALTH MODULE

The goal of the Health Module is to promote and sustain the physical, mental, and social well-being of workers. A healthy worker is a valuable resource for a company. BMA fully supports the BHP Billiton Zero Harm policy "to create a workplace that is injury, illness and incident free". BMA currently monitor the health of its employees in accordance with legal and where possible business requirements. The introduction of the Health Module will assist in the management and scheduling of medical services and their follow-up. The BMA health module draws employee information from the Human Resources (HR) module which has long existed in SAP and organises the data in different ways as defined below.

There are two key areas of the Health Module. The first is Scheduled (or Planned) – preventative programs to test and monitor the potential medical risks of employees exposed to site hazards. The second is Unscheduled (or Unplanned) – people suffering injury or illness, and needing reactive medical treatment.

HEALTH MODULE DEFINITIONS

Master Data – Within SAP, master data is the term used to describe tests, examinations, question catalogues, questionnaires, protocols, assignment of protocols, health centres, address management and exposure groups.

Health Centres - Each site becomes a health centre and each employee on that site belongs to that health centre. All system security is based around a health centre and the system is fully auditable.

Positions - Within the group or within each health centre, each employee is linked to a HR Position. The HR Positions in turn are then assigned to Exposure Groups and Tasks.

Exposure Group - In SAP an Exposure Group is defined as a group of persons who are exposed to the same agents and to the same exposure rating for these agents.

- HR Positions are assigned via a "relationship" to Exposure Groups
- Agents and Hazards are assigned via a "relationship" to Exposure Groups – with Exposure Levels
- The OH Module is linked to the Hygiene Module via Exposure groups

Tasks - A list of tasks is created and is assigned via a "relationship" to a position. For example crane driver, welder etc.

Health Surveillance Protocols - A protocol is a set of medical examinations and tests that a person must undergo to enable possible health risks to be recognized, treated and, if need be, prevented. Health surveillance protocols may be necessary when a new employee is hired, or when a person is exposed to certain agents on the job or at the workplace. There are four types of protocols:

- Unscheduled – e.g. first aid treatment
- Age triggered - e.g. a mines rescue medical is annual after the age of 45 years
- Agent triggered – exposure to noise may require an annual audiogram
- Task triggered – "coal mine workers" require 5 yearly Coal Board Medicals.

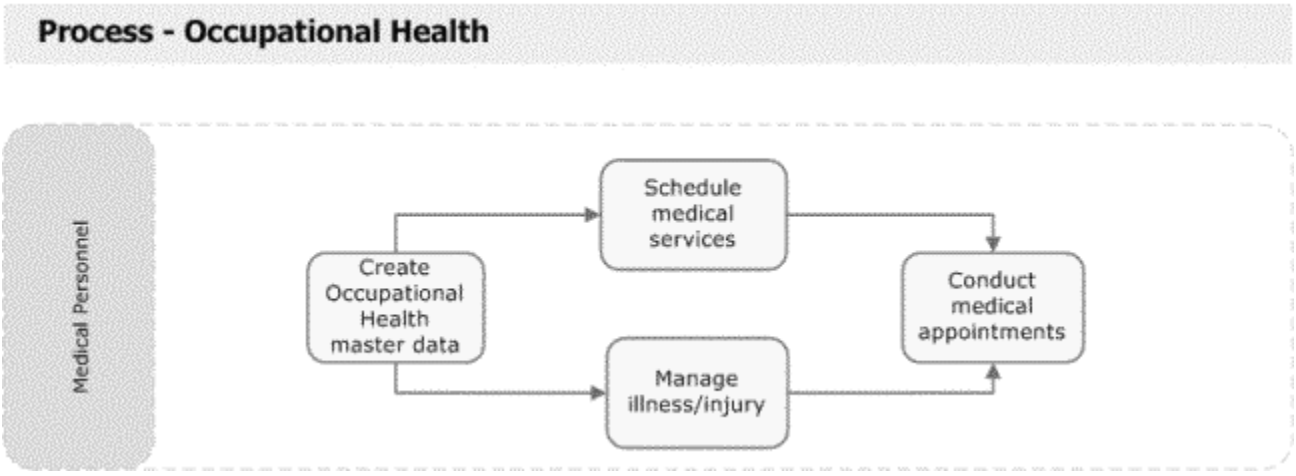
Protocols are made up of medical tests and examinations.

Examination - A medical procedure carried out in order to obtain measurable results for a medical diagnosis such as an audiogram or eye test.

Medical Test - A measured physical value that is one of a set of results that make up an examination - blood pressure, BMI or LDL cholesterol level. The Occupational Health component distinguishes between physical tests and laboratory tests.

OH BUSINESS PROCESS MAP

FIGURE 2 – OCCUPATIONAL HEALTH PROCESS



Each person has a position assigned through Human Resources. Each person is also assigned to a Health Centre. Positions are then assigned in two ways – to tasks e.g. crane driver, and to exposure groups e.g. welders. The module then proposes different protocols or health surveillance based on analysis of the above information and information from the Hygiene Module detailed in Phase Two, below.

Propose Medical Services

Based on the tasks a person performs and their agents with exposure data from the hygiene module, the system proposes the required health surveillance. For BMA, the most common is the Coal Mine Worker's Health Surveillance and it's follow up. Additional health surveillance is required for people in certain groups or tasks such as Mines Rescue Workers. Users can manually enter or alert the proposed protocols.

Schedule / Attend Medical Services
The Health Module allows BMA to schedule and manage preventative programs to address the risks of people suffering from health problems. People suffering injury or illness, and needing reactive medical treatment are also recorded in the system. Security of the system is set up to ensure that only appropriate persons have access to this information and the system is fully auditable.

Reporting
BMA do not collect detailed and specific medical information from the Coal Mine Workers Health Surveillance scheme. The system does however, link information between the health and hygiene modules to allow BMA to provide the assessing doctor with quantified information regarding health hazards related to the proposed position for medical assessment.

Reports within the Health Module are grouped in the following reporting categories:

- Health surveillance protocols
- Exposure groups
- Health centres
- Persons
- Tests
- Utilities

The user's ability to access the different reports is based on their security so those with limited security may be able to determine how many workers attended a health surveillance service, but not who each of those was. Those with the task of scheduling services will see exactly who is due for the service so that they may advise them of such.

BMA is required to provide information to BHP Billiton each six months on health surveillance. The Health Module is currently being extended to allow for specifically generated reports to feed into the corporate report, thus saving each site a time and ensuring integrity of the information.

IMPLEMENTATION OF THE OCCUPATIONAL HYGIENE MODULE

CURRENT HYGIENE PROGRAM WITHIN BMA

Initial Survey
BMA's longstanding hygiene monitoring program consisting initially of walkthrough surveys conducted by competent hygienists to determine:

- The types of chemical, physical and biological hazards that are, or are likely to be present at the site,
- Which groups or persons are potentially exposed to the hazards and
- The estimated extent of exposure and the risk associated with the exposure [3]

Each new site has its own initial survey.

Quantitative Assessment
Each site has a quantitative monitoring program instigated to address the potential issues raised in the initial survey. Information from the initial survey is used to specify exposure groups of workers who literally face similar exposures to potential hygiene hazards in their work. Exposure groups can also be called SEGs – Similar Exposure Groups or HEGs – Homogenous Exposure Groups. For the purposes of this paper they are referred to simply as Exposure Groups or EGs.

Sampling Schedule
Sampling is scheduled based on the population of each EG based on guidelines by the American Industrial Hygiene Association (AIHA). Once the baseline quantitative assessment has been completed, appropriate maintenance sampling is scheduled and conducted.

Follow-up Surveys
BMA conduct follow up surveys every five years and changes are made to the maintenance sampling as determined on review of the data analysis.

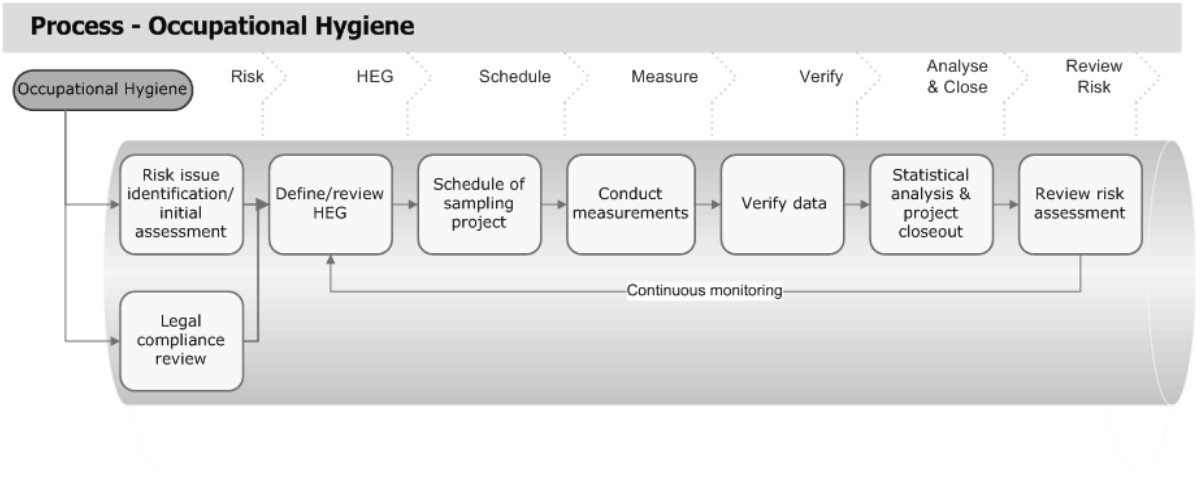
HYGIENE MODULE DEFINITIONS
Work Area – Work areas are created which define processes, plants, task areas, or groups of people. They also define locations within an environment (e.g. a canteen or a shower block). To differentiate between the various sites, work areas are maintained in a work area hierarchy. Work areas are linked to the higher-level enterprise structure by assigning the work area to a plant.
Exposure Groups – within the work areas, exposure groups are created. Exposure group consists of persons who are exposed to the same agents, and to the same exposure rating for these agents for similar periods of time, or who have similar tasks.

Agent - Contaminant or hazard that poses a risk to the safe working operations of a work area, eg. Silica, benzene, Inhalable dust which have been identified in the hygiene surveys are associated
Reference Value - A benchmark value for an agent (contaminant) against which actual sample measurements and project average values are compared to determine potential risk. BHP Billiton also refers to reference values as OELs (Occupational Exposure Limits) [2].
Measurement method - Sourced from OSHA, MDHS and NMAM and mapped to agents and device types, these measurement methods have been set up in the module. These are then linked to the appropriate analysis types.
Analysis type - Dust, Gas Vapour Active, Gas Vapour Passive, Noise, Fibre Count, and Analysis Result Only

SAP HYGIENE MODULE BUSINESS PROCESS

The business flow in the Hygiene Module maps that currently used by BMA in our hygiene monitoring program.

FIGURE 3 – HYGIENE PROCESS



1. IDENTIFY AND ASSESS RISK

Based on the identification of a risk issue, an initial risk assessment determines if the level of the risk (based on the available information) is sufficient to warrant mitigation actions and/or a formal sampling plan. Risk assessments are unique based on the combination of work area, agent and operational status.

A review of Legal Compliance issues is also required at this stage with relation to specific agents, exposure groups and sampling programs in order to meet the legal obligations.

2. MANAGE MEASUREMENT PROJECTS

Measurement projects are created to suit each workplace and exposure group based on the risks identified. For example, a workplace may choose to create one measurement project that incorporates all the work areas/agents in the workplace, or may create one measurement project per work area/agent. When creating a new project, previous projects can be used as a template and simply altered, saving a great deal of time.

Conducting Measurements - Samples are performed according to the requirements of the measurement project (i.e. agents to be sampled, devices to be used, number of samples etc).
Verification of Data - To ensure that measured data is accurate, the Occupational Hygienist checks the validity of the data. Validity checks can also be performed manually based on the results entered in SAP. Measurements are then recorded as either:

- recorded successfully
- a mis-measurement - exclude sample measurements that are invalid and record a reason
- a 'No Measurement' - no value recorded.

Thank you Letters - Letters to participants are generated by Occupational Hygienist either singly or in batches to thank participants for their assistance and advise the participant of their individual result, how it compares to the reference value and any action required. The letter also advises where to seek further information if required.

Calculation Methods
The following calculation methods have been set up in the SAP system. Each calculation method has a separate calculation detail screen. Each measurement method is mapped to the calculation method.

- Dust (with subtypes Inhalable, Respirable)
- Gas Vapour Active

- Gas Vapour Passive
- Noise
- Fibre Counting
- Direct Measurement

Sample Creation
Once the samples have been created then the user will have an option as to how the subsequent sample data recording screen is reached. The aim is to allow simple method for entry of multiple sample records and to allow for separation of different roles for different end users.

Equipment Calibration
The potential exists to link maintenance and calibration records of monitoring equipment to the SAP Plant Maintenance Functionalities already used by maintenance personnel at BMA. Due to the fact that most monitoring is outsourced, this function will not be used a lot but where equipment is owned by a site, the maintenance and calibration records are linked to the sample records.

Sampling and Analysis Scenarios
The SAP system allows for 3 potential scenarios:
- 1) Sampling and analysis done by BMA
- 2) Sampling by BMA, analysis by 3rd Party
- 3) Sampling and analysis by 3rd Party (this is the scenario most used within BMA)

For Scenario 2 & 3 the possibilities of reported data are:
- A) Results are reported as raw data and calculations and the business requires them to enter the data and check the calculations.
- B) Results are reported as only Final Calculated Values.

The effect of the scenarios is to change what data is available for entry.

Statistical Analysis & Project Closeout -
The Occupational Hygienist exports the recorded values, performs statistical analysis and then records the statistical values back into SAP. If the results are acceptable, the Hygienist accepts them and records the relevant statistical information for the EG against the log sheet. If the reference value is exceeded, an Event is raised in First Priority – the event management software BMA uses. The Occupational Hygienist releases the individual measurements and log sheets, and releases and closes the measurement project.

REVIEW RISK ASSESSMENTS
When a measurement project is released, the average measured values entered as part of the scope of a measurement project are automatically transferred to the Amounts section of the relevant risk assessment record in SAP.
If no risk assessment existed in SAP prior to the release of the measurement project, a risk assessment is created automatically (provided the project is not identified as being a legislative sampling project). If a risk assessment existed in SAP prior to the release, the measurement project values are transferred to the Amounts section of the relevant risk assessment record without creating a new risk assessment.
At the close of a measurement project, transfer the measurement data from the measurement project to the related risk assessment. Update the risk assessment with a residual risk rating, which determines whether additional actions are required to reduce the ongoing risk level, and whether a follow-on risk assessment is required.

Based on the final risk assessment, or in the case of sampling due to legislative requirements, a new sampling program may be required. If so, the development of this program should begin with a re-assessment of the validity of the homogenous exposure group.

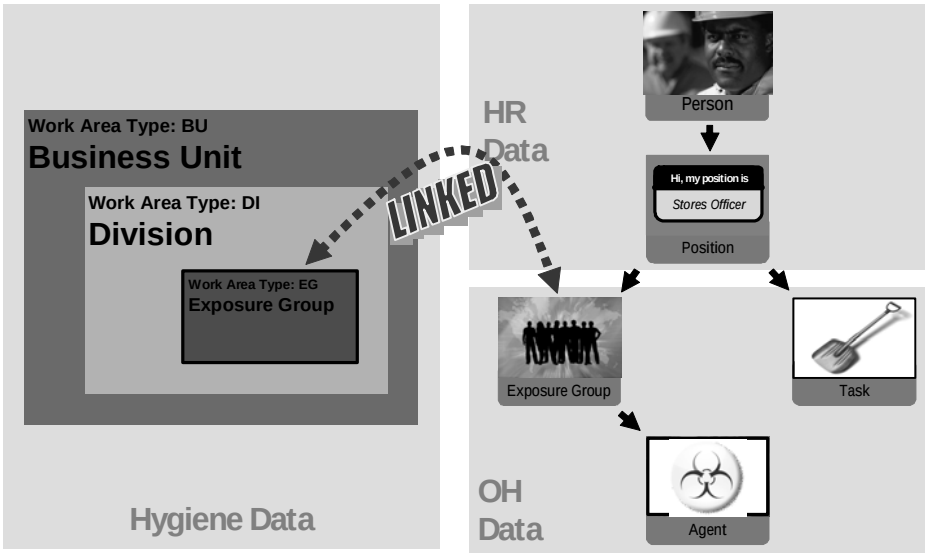
Reporting
There are four groups of reports which in total contain 26 different reports on all aspects of the program from contaminants to exposure calculations of exposure groups.
Risk assessment
Measurement Management
Incident Log
Utilities

As with the Health Module, these reports are designed to respond to the BHP Billiton six monthly corporate reporting requirements.

LINKING THE HEALTH, HYGIENE AND HR MODULES

The occupational hygiene module links to the health module by utilising information on exposure groups from the different work areas. This is depicted in Figure 4. Also depicted is the relationship to the HR data.

FIGURE 4 LINKING THE MODULES



References

1. Farry, J (2007) *Health Exposure Assessment: A 'step change' in occupational hygiene management.* QMIHSC 2007
2. BHP Billiton Occupational Exposure Limits (P09)
3. BHP Billiton Health Exposure Assessment (G14)

**SAP stands for Systems Applications and Products in data processing. SAP is the name of the software and SAP is a BHP Billiton term standing for Global SAP. SAP already includes SAP modules such as Plant Maintenance, Financial Accounting and Human Resources. All the modules of SAP integrate to share information.*