Enterprise Automation Solution

The management of offshore oil & gas fields is moving towards integrated operations using integrated data across disciplines and business domains. By integrated operation, upstream oil & gas company is challenging increased complexity in unconventional and remote environments. Integrated operation is achieved with integrated system. Tightly integrated system changes the way to work and enhance decision making quality and speed.
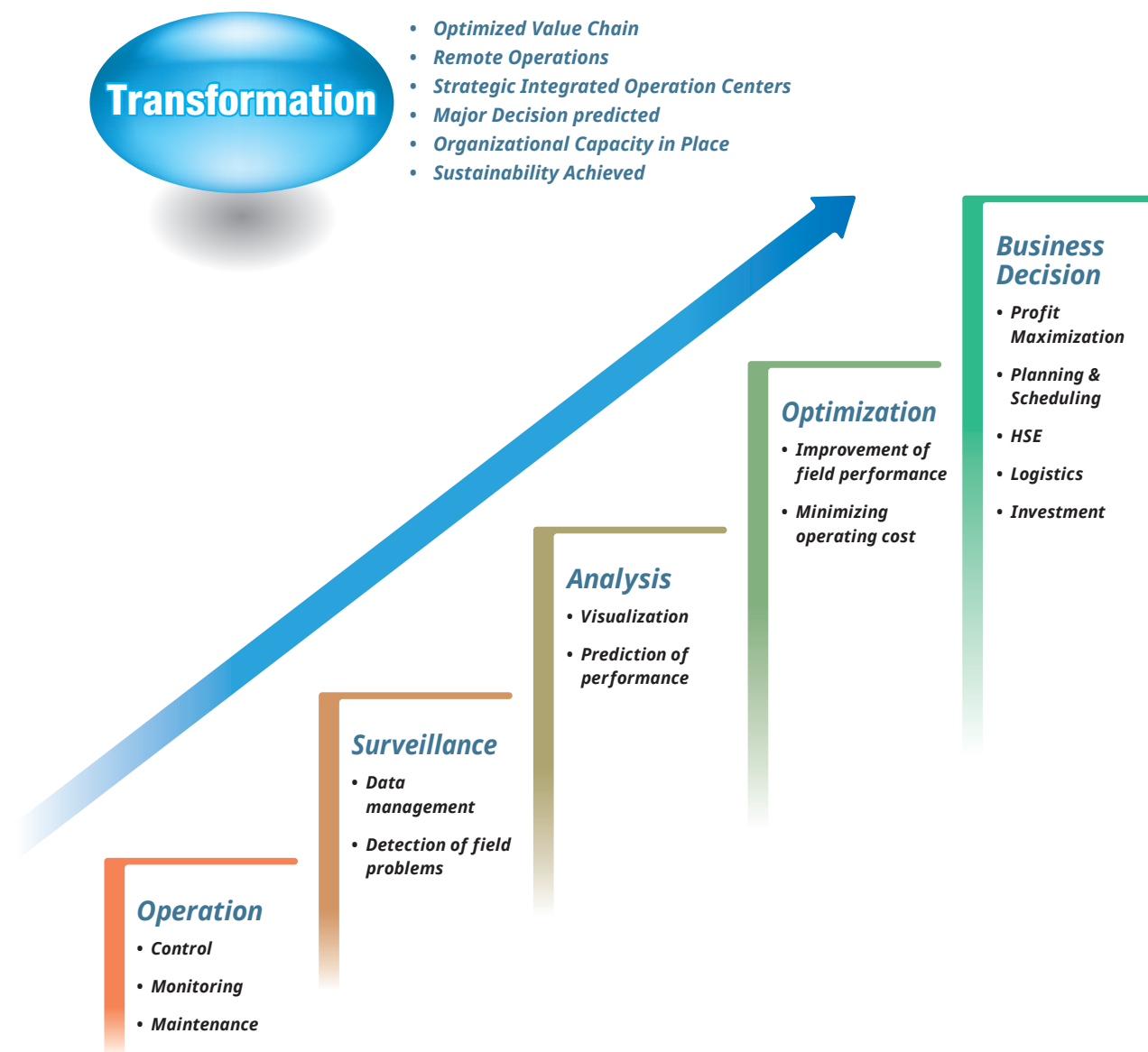
Enterprise Automation Solution (EAS) is a solution that delivers real-time and historical automation information from the plant or field to the enterprise level for analysis, research, asset monitoring, and control of distributed automation systems.

EAS covers two areas. One is Automation zone, where primary task is control and monitoring. The other is Enterprise zone, where primary task is to make decisions with surveillance, analysis, and optimization. Following figure shows the decision making process from field data.

In order to improve safety, production and efficiency, people need to have the best possible information in a way they can work with. EAS delivers the right automation-related information to the right people at the right time to make the right decision.

Transformation

- **Optimized Value Chain**
- **Remote Operations**
- **Strategic Integrated Operation Centers**
- **Major Decision predicted**
- **Organizational Capacity in Place**
- **Sustainability Achieved**

Business Decision
- *Profit Maximization*
- *Planning & Scheduling*
- *HSE*
- *Logistics*
- *Investment*

Optimization
- *Improvement of field performance*
- *Minimizing operating cost*

Analysis
- *Visualization*
- *Prediction of performance*

Surveillance
- *Data management*
- *Detection of field problems*

Operation
- *Control*
- *Monitoring*
- *Maintenance*

Yokogawa defines the operation and responsibility for entire oil and gas production work process point of view as follows:

HQ business management (Level D)

- Profit management with HR and HSE
- Upstream Business Strategy planning and development
- Business Decision analysis (e.g. KPI)

Decision Support Center/Collaboration Center (Level C)

Subject Matter Expert (SME) in charge of surveillance, analysis, and the short term (day to week) optimization of the upstream facilities at decision support center
- Quick identification and resolution of problems
- Increased engineering focus on high value technical analysis
- Improved knowledge capture, access and reuse
- Cross discipline operations focus on the mid-term supply chain opportunities

## Remote Operation Center (Level B)

Facility operators monitoring production at onshore control center
- Coordinate and/or control the entire oil and gas production or only provide operations support on a as needed basis

Onshore/Offshore Platform (Level A)

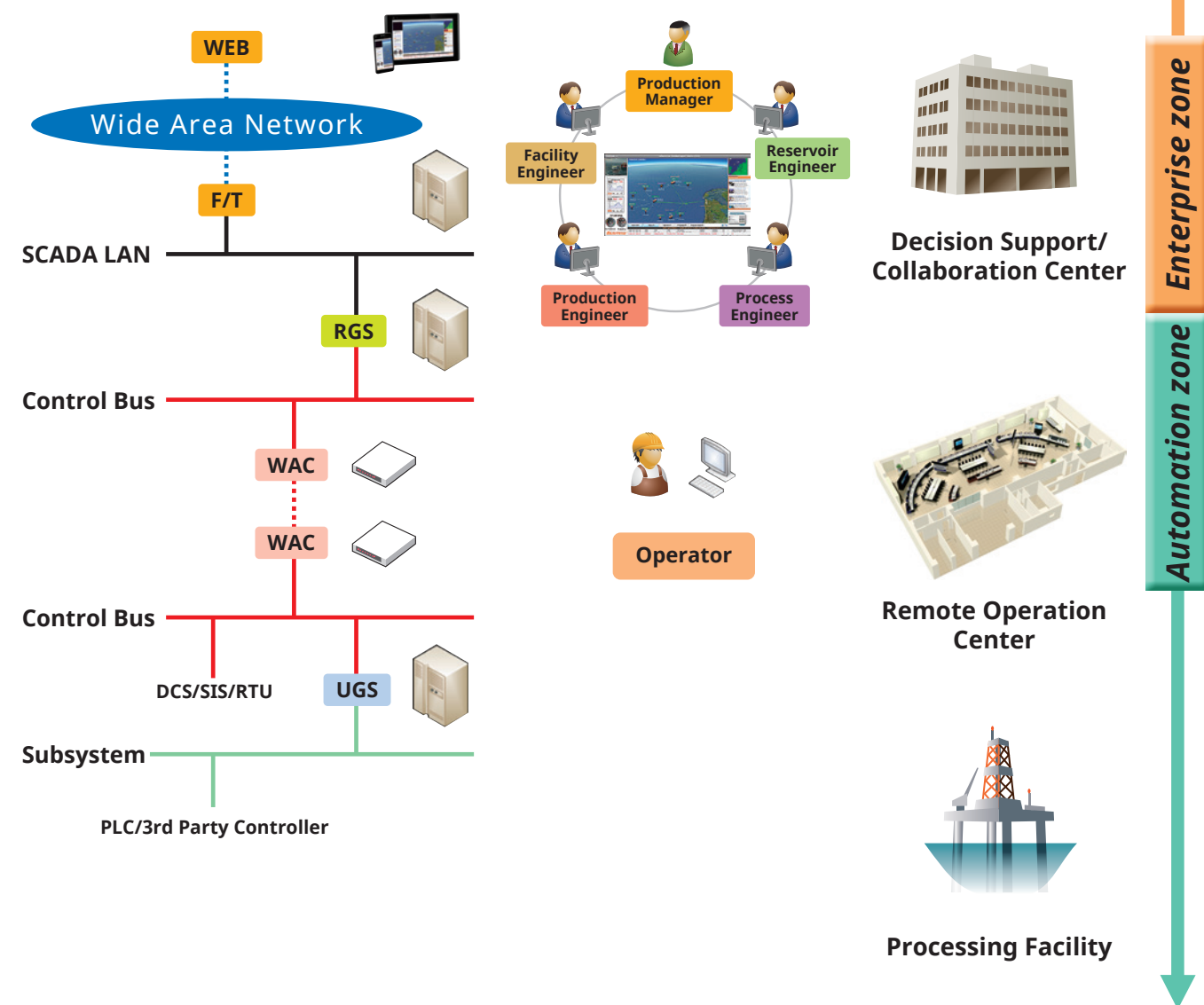Operation and maintenance at Onshore/Offshore
- The primary task is to monitor equipment performance
- In the event of an abnormal condition, operators will initiate action to mitigate the impact and return the asset to a suitable operating status
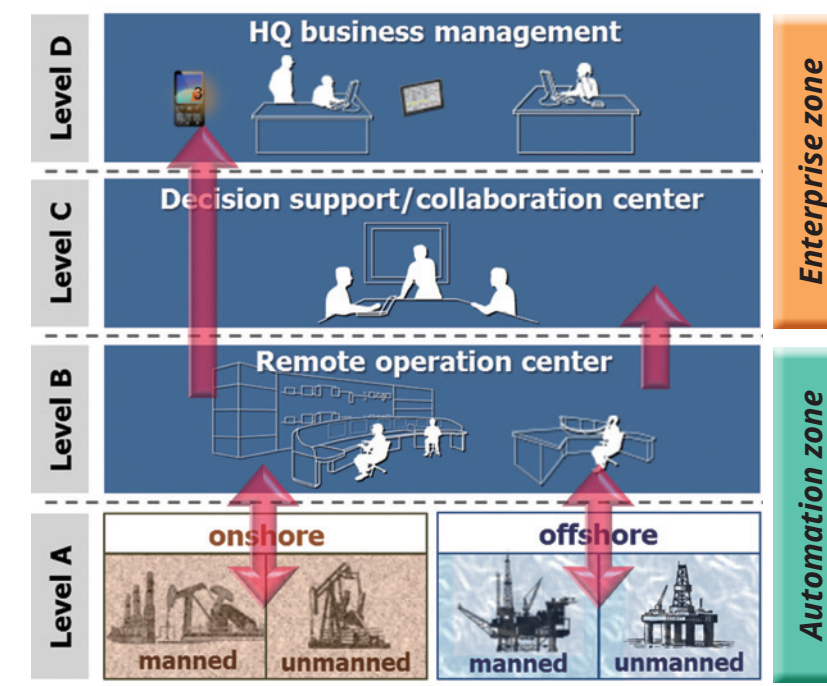
Yokogawa's Key Enablers for Upstream Operation

WEB: HMI Web Server/Client
F/T: FAST/TOOLS Server
RGS: Remote Gateway Station
WAC: Wide Area Communication Router
UGS: Unified Gateway Station

WEB

Wide Area Network

F/T

SCADA LAN

RGS

Control Bus

WAC

WAC

Control Bus

DCS/SIS/RTU   **UGS**

Subsystem

PLC/3rd Party Controller

Director
HSE Manager
Supply Chain Manager
Subject Matter Experts
Production Manager

Global Headquarters

Production Manager
Facility Engineer
Reservoir Engineer
Production Engineer
Process Engineer

Decision Support/ Collaboration Center

Operator

Remote Operation Center

Processing Facility

Enterprise zone

Automation zone
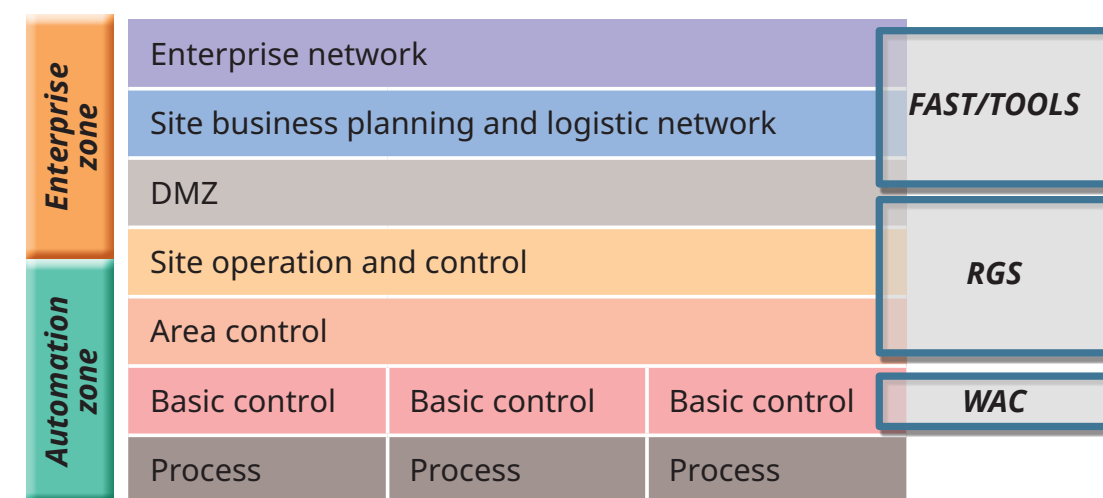
FAST/TOOLS (SCADA)

FAST/TOOLS is Yokogawa's web-based solution that can be fully integrated with Workflow Management application. It is a real-time information management and visualization software environment that brings together our process management infrastructure, automation expertise, and ecosystem support for greater efficiency and improved operational agility. It can be deployed from traditional SCADA applications up to Enterprise Automation Solution.
FAST/TOOLS can also manage and integrate other company's sensors and controllers with open interface, such as OPC, HART, Foundation Fieldbus and ISA100wireless.

Supervisory Systems
FAST/TOOLS™

Remote Gateway Station (RGS)

Remote Gateway Station facilitates the integration between CENTUM VP and FAST/TOOLS.
RGS delivers an integrated automation solution, which supports a corporate wide automation strategy across multiple domains and geographies. This is achieved by providing access to Vnet/IP and managing the low bandwidth and intermitted communication requirements over remote network infrastructures at the top end from FAST/TOOLS.
Additional functions are provided for communication with CENTUM VP, which allow variable data and function block data to be read/write by FAST/TOOLS.

Enterprise zone	Enterprise network			**FAST/TOOLS**
	Site business planning and logistic network			
	DMZ			
Automation zone	Site operation and control			**RGS**
	Area control			
	Basic control	Basic control	Basic control	**WAC**
	Process	Process	Process	

Wide Area Communication Router (WAC)

Wide Area Communication Router (WAC Router) is the hardware equipment to connect Vnet/IP domains via Wide Area Network (WAN). Operations and monitoring of the Field Control Station(FCS)/Safety Control Station(SCS) that are distributed in remote areas can be realized.
Satellite communications can also be used as a WAN.

Unified Gateway Station (UGS)

The Unified Gateway Station is a Vnet/IP station that unifies subsystem controllers such as STARDOM controllers and 3rd party PLCs (Modbus/TCP, EtherNet/IP, OPC DA, etc.) to a CENTUM VP system.
With the extent of UGS, operation and monitoring of the subsystem controllers can be performed on HIS in the same way as a CENTUM VP field control station.

Implementation of Integrated Operation Center by Integrated HMI

Integrated Operation Center (IOC) is an environment connecting local and remote sites across a wide range of disciplines. IOC covers surveillance, analysis, and optimization. Subject Matter Experts (SMEs) of onshore sites and production managers sitting in headquarters can browse the process data with their PCs, tablets and smart phones just the same as offshore wellhead platforms and operators of Central Production Facility (CPF). They can see the same information as the operator's screen in automation zone.

The top executives browse the historical data monthly, weekly or daily, and draw up all oil and gas production plans, create Key Performance Indicators (KPI). And if necessary, they can also refer to the data every hour or every minute, so they can understand the plant condition dynamically, revise the production plan and carry it out.

They can consider the temporary influence on production by using web applications such as market predictions and weather forecasts. SMEs adjust and optimize production and support remote operators based on the revised plan.

SMEs and production managers in headquarters can inspect process data on demand by Remote Gateway Station (RGS). The RGS serves as a gateway between CENTUM VP and FAST/TOOLS. The RGS can directly communicate with Field Control Station(FCS), Safety Control Station(SCS), and Unified Gateway Station(UGS) over Vnet/IP to get log data, graphic data to be used in web applications.

Open architecture supporting various communication protocols including OLE for Process Control-Unified Architecture (OPC-UA) ensures that EAS can easily be integrated with other business applications and/or systems, such as Graphical Information System (GIS), weather, Enterprise Resource Planning (ERP)/SAP, and Energy Components (EC) information not normally provided in control systems.

Implementation of Remote Operation Center/Decision Support Center

SMEs monitor a several of offshore platforms from onshore site, but they are not always at the offshore site. They support local operators as an emergency room in case of abnormal situation. Once production troubles occur, the impact on production becomes serious, the local operator requests SME's support from onshore site.

When SMEs receive a support request, they share operation graphic with the local operator, and collect plant information. SMEs at the Decision Support Center reproduce the errors, find root causes, construct methods to resolve the problems, and then instruct the local operator how to resolve the problem. This kind of collaboration is provided by both Remote Gateway Station (RGS) and FAST/TOOLS server. Plant alerts are generated by FAST/TOOLS server via RGS.

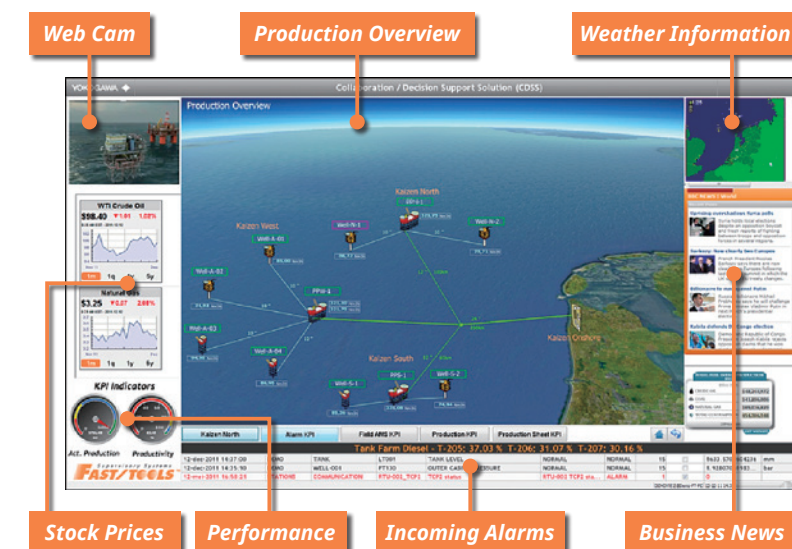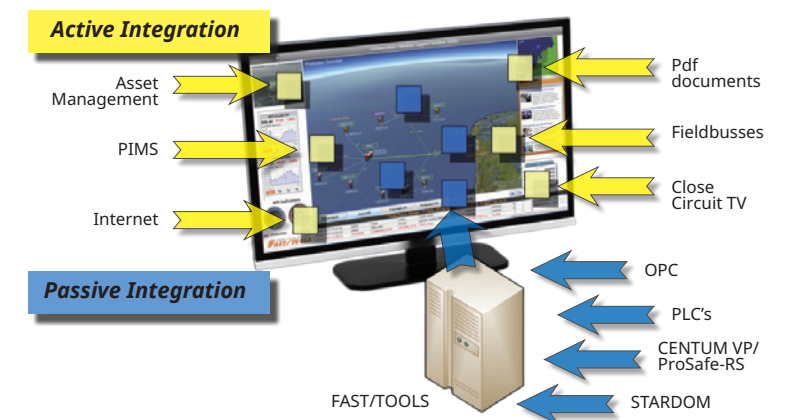## Emergency Operation in Natural Disaster by WAC Router

Onshore operators who are located far from offshore platforms can operate and monitor the processes remotely. Once natural disasters occur, remote operators at onshore site can have the offshore operators evacuate quickly, and reduce platform operation gradually from the onshore site.

The Wide Area Communication (WAC) router is connected to the control bus (Vnet/IP) directly, so it can receive data request from onshore operation station, and then make the request for the data to the appropriate nodes on Vnet/IP network.

The WAC router is installed both offshore and onshore. The WAC converts Vnet/IP protocol into TCP/IP so that it can be transferred over the Wide Area Network (WAN). The WAC is connected to two different Vnet/IP domains directly, which are located several miles away. The Remote operator controls and monitors the offshore platforms from onshore site over wide area networks.

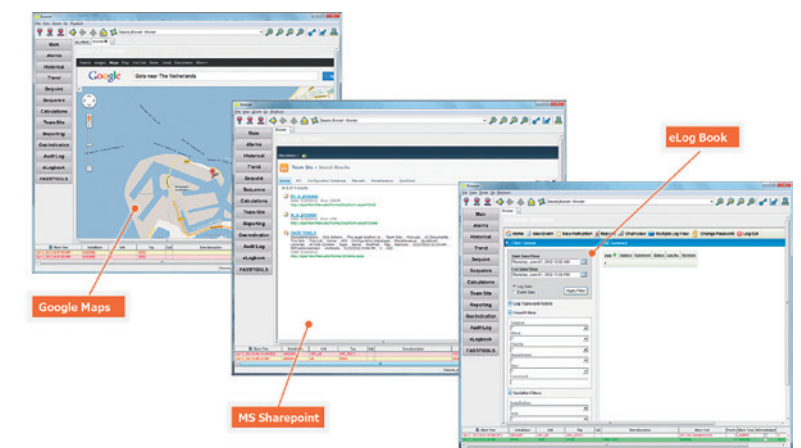## Unified Visualization Layer Across Multiple Sources

FAST/TOOLS is not only capable to integrate passive field data and monitor/control on it but also actively bring information from different sources without engineering effort as an information service into its flexible visualization environment components.

Active Integration

Asset Management
PIMS
Internet

Pdf documents
Fieldbusses
Close Circuit TV

Passive Integration

OPC
PLC's
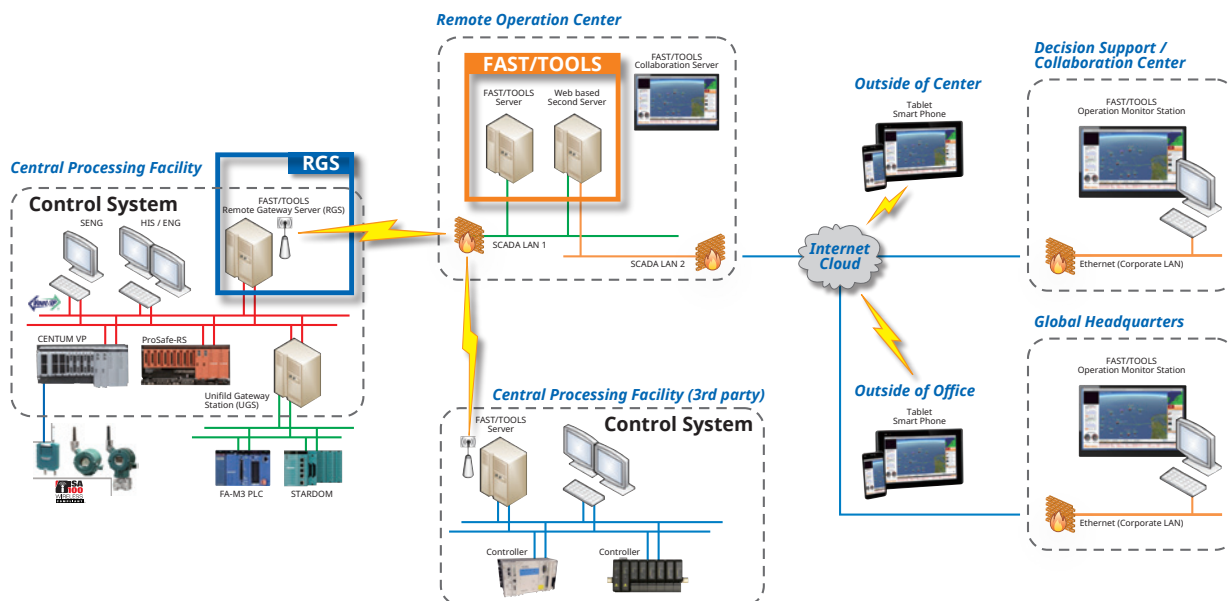CENTUM VP/ ProSafe-RS
STARDOM

FAST/TOOLS

By utilizing FAST/TOOLS at the same time as a unified visualization layer across active and passive data and information sources, one view on overall production performance across facilities can be obtained and presented side by side with actual business information and site conditions.

Web Cam   *Production Overview*   *Weather Information*

Stock Prices   *Performance*   *Incoming Alarms*   *Business News*

Embedding 3rd party Web Clients

In addition the URL component can also be used to easily embed 3rd party HTML5 based web clients from applications such as Google Maps, Microsoft SharePoint or Yokogawa Solution-Based Package (SBP) elog book into an unified human interface layer based on FAST/TOOLS.

eLog Book
Google Maps
MS Sharepoint

Typical Configuration of FAST/TOOLS SCADA SYSTEM

Represented by:

https://www.yokogawa.com/solutions/products-platforms/control-system/supervisory-control-and-data-acquisition-scada/

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