

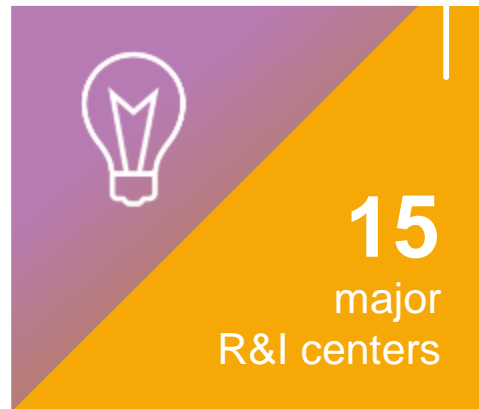
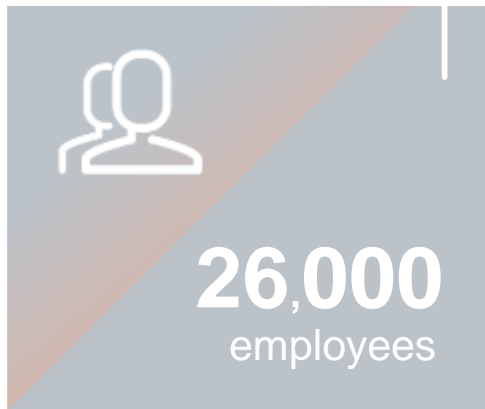


PI System as an Aid for Prevention and Protection against Pollution

Presented by **Michele Albicocchi**



A world leader in the chemical industry



2014 figures

A balanced presence in all growth regions



2014 figures

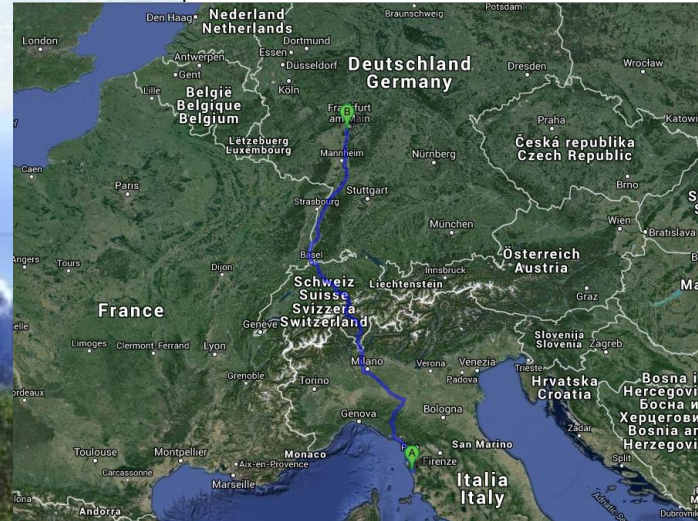
Rosignano factory

Historical notes

- Building start 1912
- Production start 1917

The factory occupies 2.2 km²

- Sales: 290 M€
- Investments and maintenance: 30 M€
- Directly employed people: 591 (2015)



2013 figures

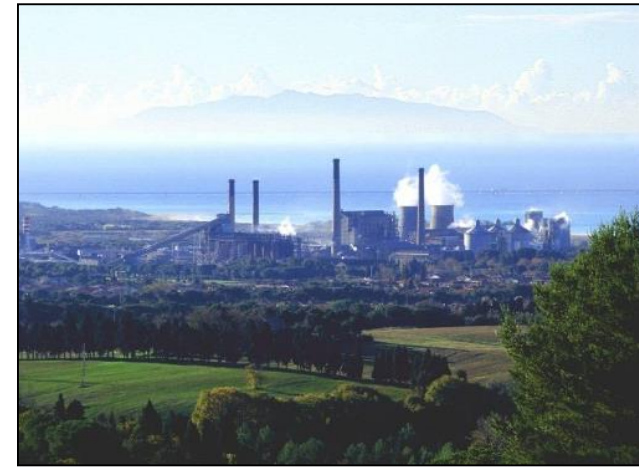
Production Capacity



Soda ash	940 kT / year
Sodium Bicarbonate	260 kT / " "
Calcium Chloride	120 kT / " "
Caustic Soda	190 kT/ " "
Chlorine and derivatives	300 kT/ " "
Hydrogen Peroxide	35 kT / " "
Sodium Percarbonate	50 kT/ " "

PI System as an Aid for Prevention and Control of Pollution

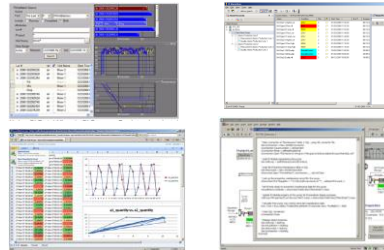
PI System tracks all warning or alarm events that must be justified by plant operators in the context of continuous improvement of plant environment impact and more over keeps people informed of the evolving situation.



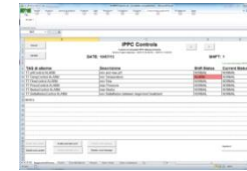
Business Challenge



Solution



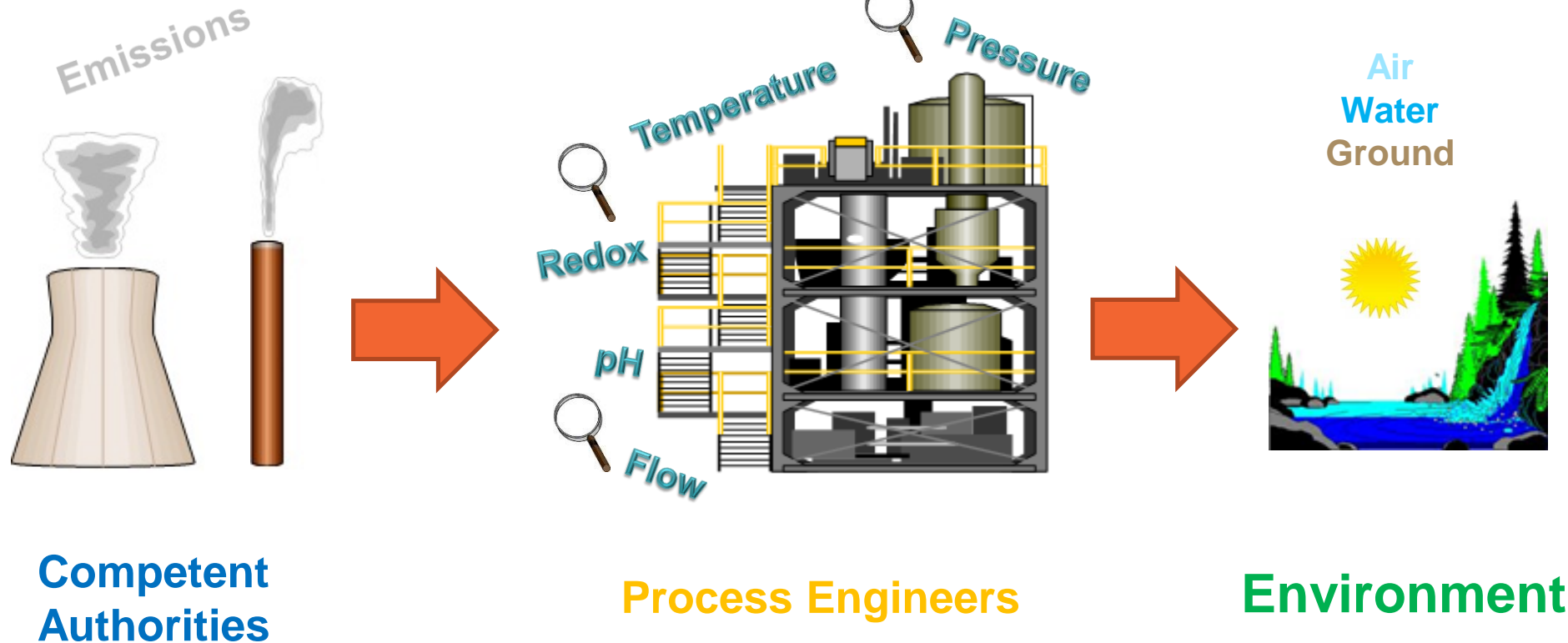
Results and Benefits



Integrated Pollution Prevention and Control (IPPC)

- European Strategy to improve environmental performances
- European Directive 2008/1/EC and later 2010/75/EU
- List of Activities and Substances to keep under control
- Emission Limit Values based on Best Available Tech (BAT)
- Competent Authorities check all preventive pollution control measures have been laid down before granting a permit to any operation

Variables under Control (IPPC)



PI System as an aid to control pollution

Help for IPPC



It keeps under control those process parameters that have a direct influence on emissions related to IPPC permit

Help for Environmental Certification (ISO 14001)

By registering all abnormal conditions you can analyze them and set a process of continuous improvement

If you have an ISO 14001 certification you have a longer IPPC permit

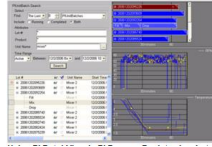
Our solution (legacy PI System)

PI Server



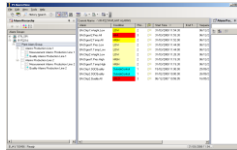
To archive Process, Calculated and Alarm Tags

PI Batch



To register Events

PI AlarmView



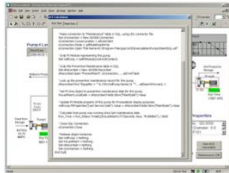
To notify control room conductors

PI DataLink



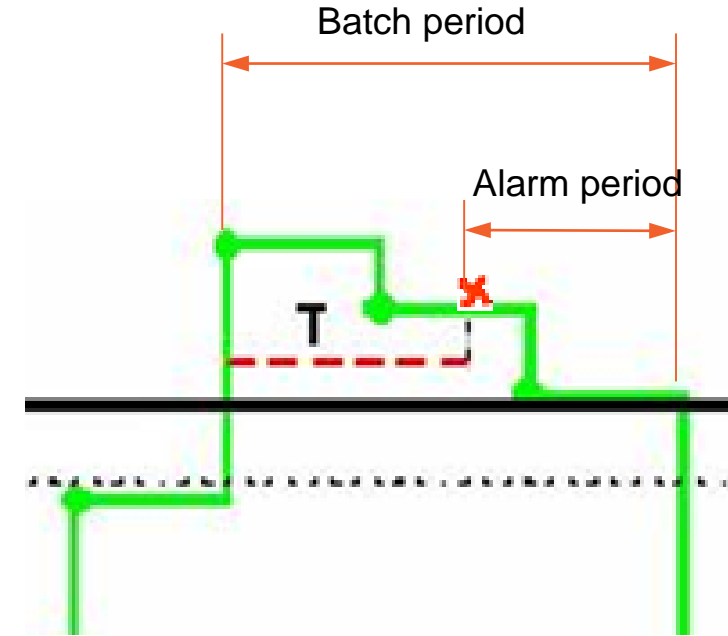
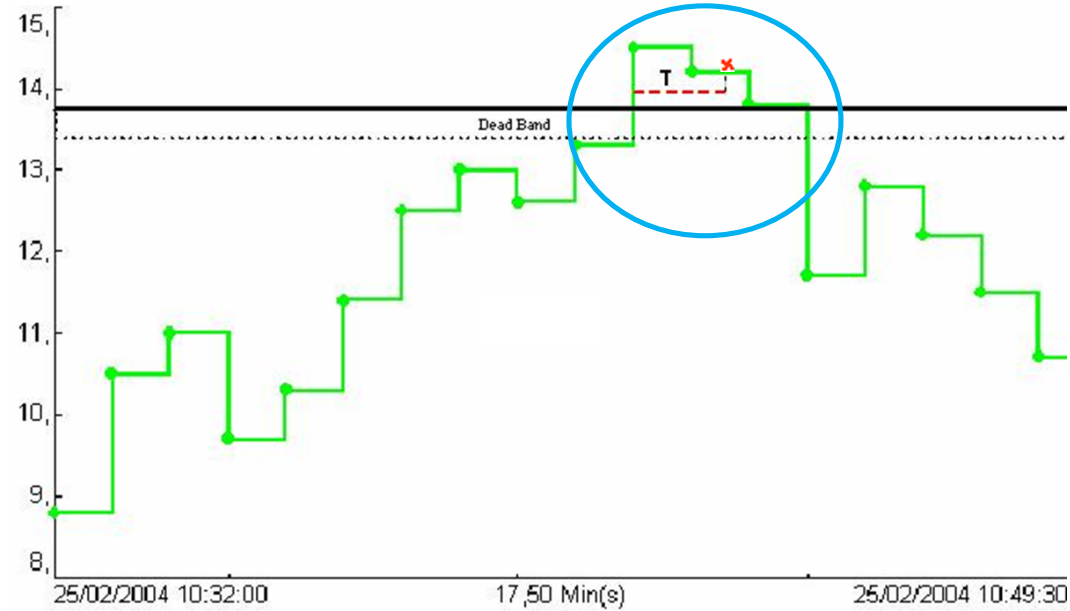
To report warning or alarm events

PI ACE

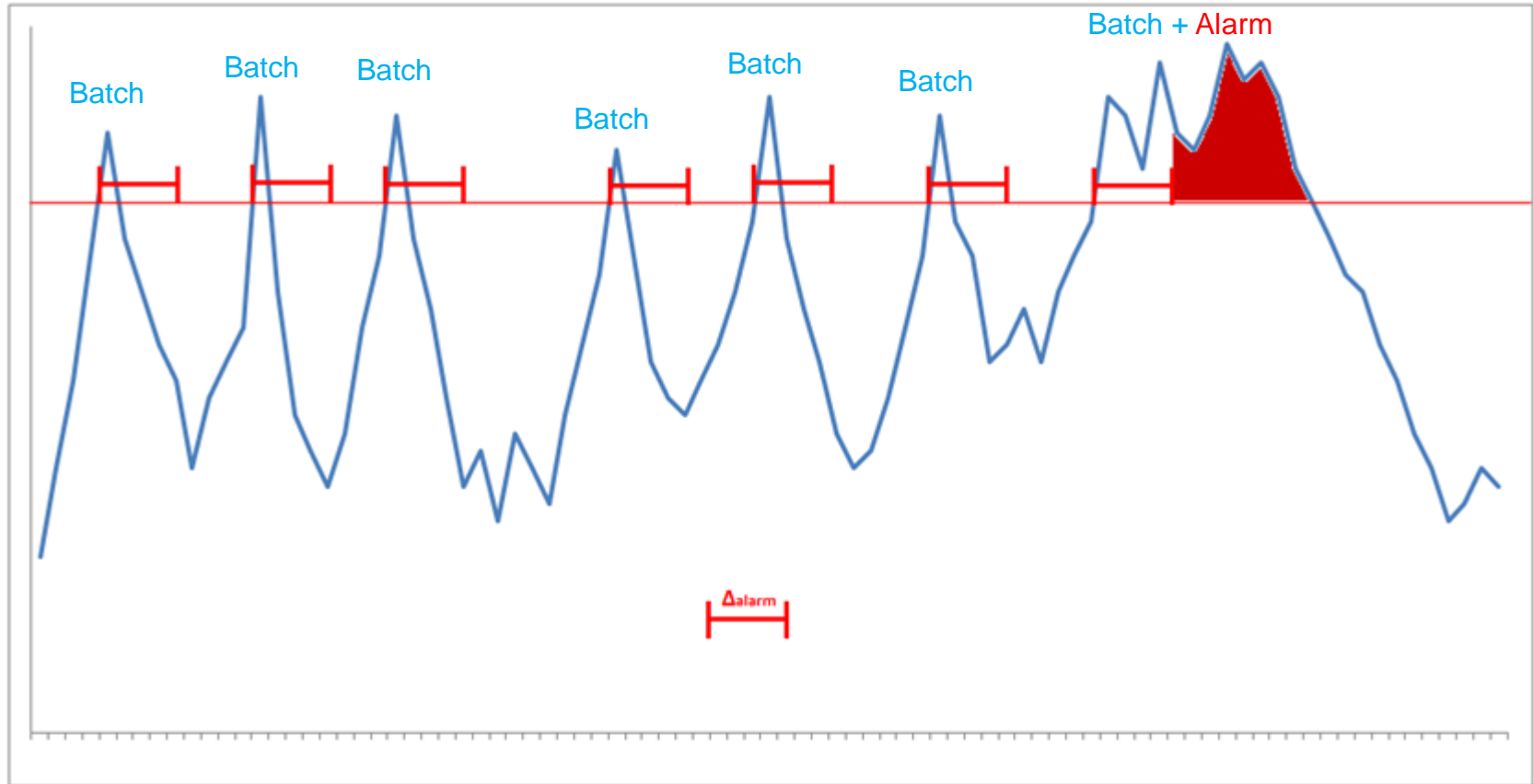


To send Alarm Notifications via e-mail/sms/etc.

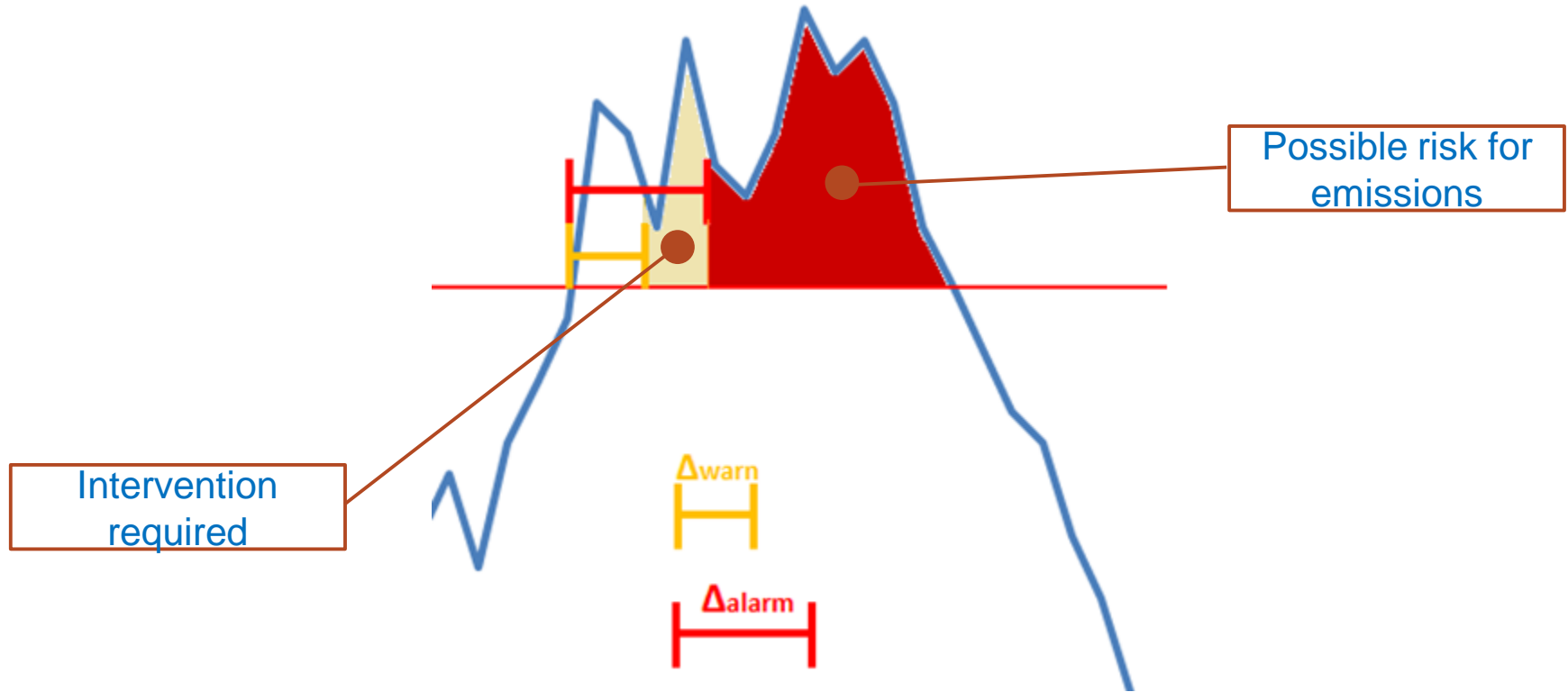
Batch and Alarm Periods



Batch and Alarm Periods

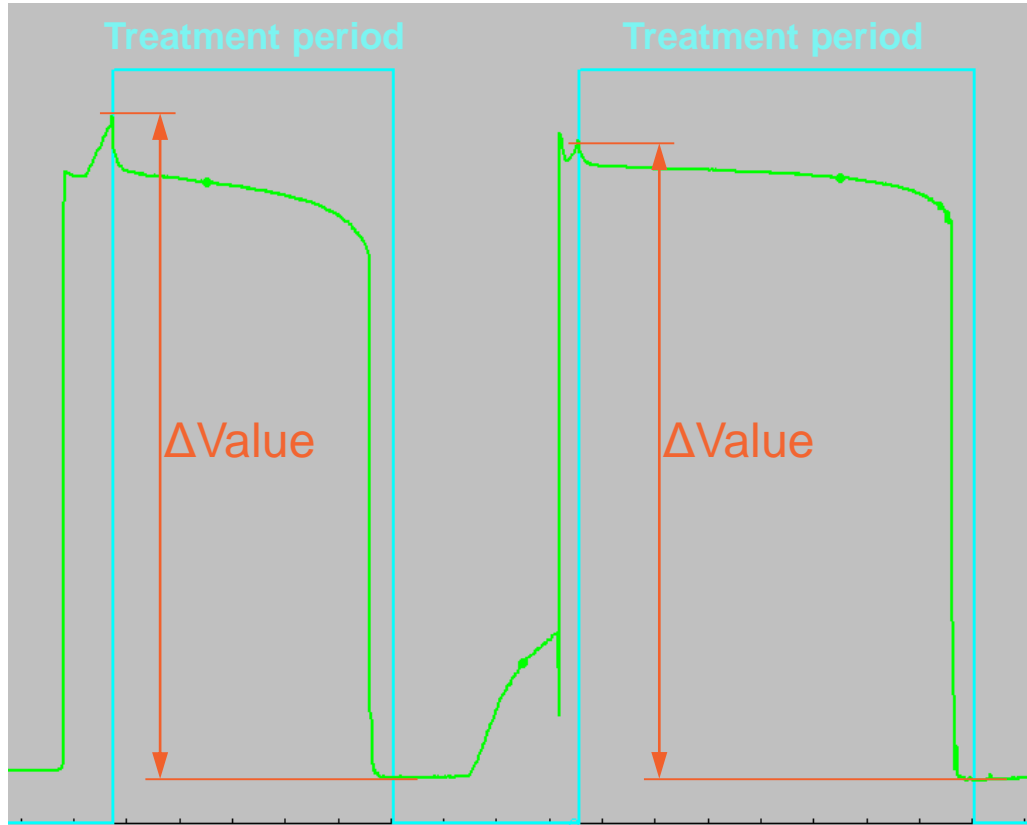


Alarm/Warning Periods



Warnings and Alarms differ only on the delay time ($\Delta_{alarm} > \Delta_{warning}$)

Treatment Efficiency



As an example, a Neutralization treatment is effective when a Delta Value is over a certain limit.

If ineffective, an alarm condition is kept from the end of the treatment until the beginning of the next one.

A similar control can be easily configured and reported in PI System. For configuration we mostly use PE and Alarm Tags.

PI AlarmView

The screenshot displays the PI AlarmView application window. The interface is divided into several panes:

- Alarm Hierarchy:** A tree view on the left showing the organizational structure of alarms, including groups like 'Gruppo Allarmi Clorometani', 'Gruppo Allarmi ECO', 'Gruppo Allarmi di S. Carlo', 'Gruppo Allarmi SO', 'Test Group', 'IPPC Test Group', 'Quality Test Group', 'Gruppo Allarmi UE', and 'Gruppo di prova'.
- Current Alarms - WTR_SPI\TT:ALARMS\TT:IPPC:** A central table listing active alarms. The table has columns for Alarm, Condition, Priority, Start Time, and Sequence Start.
- Alarm Properties:** A pane on the right showing detailed information for the selected alarm, 'TT:PressControl.ALARM'.
- Displayed Servers:** A pane at the bottom right showing a list of servers with checkboxes for '10.120.4.4' and 'WTR_SPI'.

Current Alarms Table:

Alarm	Condit...	Prio...	Start Time	Sequence Start
TT:PressControl.ALARM	HIHI	3	16/07/2013 16:00:57	16/07/2013 15:59:47
TT:TempControl.ALARM	LOLO	3	16/07/2013 15:56:20	10/07/2013 14:01:00
TT:FlowControl.ALARM			09/07/2013 10:42:14	

Alarm Properties for TT:PressControl.ALARM:

- AlarmGroup: \WTR_SPI\TT:ALARMS\TT:IPPC
- AlarmType: PIArm
- AutoAck: no
- Description: max Pressure
- DigitalSet: \WTR_SPI\pialarm33
- GroupName: TT:IPPC
- Name: TT:PressControl.ALARM
- Path: \WTR_SPI\TT:PressControl.ALARM
- ServerName: ITR_SPI
- Data:**
 - ConditionName: HIHI
 - IsNormal: False
 - SourceTag: TT:PressControl.ACTIVE
 - SourceValue: 0 -
- Extra Info:**
 - ExtraInfo1
 - ExtraInfo2
 - ExtraInfo3
 - ExtraInfo4
- PI Alarm:**
 - ControlTag
 - Deadband: 0
 - Options
 - ReferenceTag
- PI Alarm Tests:**
 - Action1: Hihi 3
 - Action2: High 2
 - Action3
 - Action4
 - Test1: EQ(1) + 2m
 - Test2: EQ(1) + 1m
 - Test3
 - Test4

Final users (like control room conductors) are also notified via PI AlarmView.

They must acknowledge any warning or alarm condition.

PI DataLink

ShiftIPPCAlarms.xls [modalità compatibilità] - Microsoft Excel

File Home Inserisci Layout di pagina Formule Dati Revisione Visualizza Sviluppo Componenti aggiuntivi PI DataLink Team

Current Archive Value Value Compressed Sampled Timed Calculated Data Data Time Filtered Calculation Search Properties Update Settings Insert Trend Point ID to Tag Attribute Mask to Tag Tag Functions Module Browse Alias to Tag Property to Value Module Database

E38

Reset

Update

IPPC Controls

Control of sensible IPPC Measurements

Period of alarm detection: 16/07/13 13:00:00 - 16/07/13 21:00:00

DATE: 16/07/13

SHIFT: 2

Last control timestamp: 16/07/2013 10:00:46

TAG di allarme	Descrizione	Shift Status	Current Status
TT:pHControl.ALARM	min and max pH	NORMAL	NORMAL
TT:TempControl.ALARM	min Temperature	ALARM	NORMAL
TT:FlowControl.ALARM	min Flow	NORMAL	NORMAL
TT:PressControl.ALARM	max Pressure	NORMAL	WARNING
TT:RedoxControl.ALARM	max Redox	NORMAL	NORMAL
TT:DeltaRedoxControl.ALARM	min DeltaRedox between begin/end treatment	NORMAL	NORMAL

NOTES:

Enable/Disable auto update

Enable/Disable automatic print

Enable/Disable vocal message

Enable auto-update

Enable automatic print

Enable vocal message

Disable auto-update

Disable automatic print

Disable vocal message

Signature:

RapportoDiTurno Eventi EventDiAllarme Modulo Alarm State Stato Analizzatori

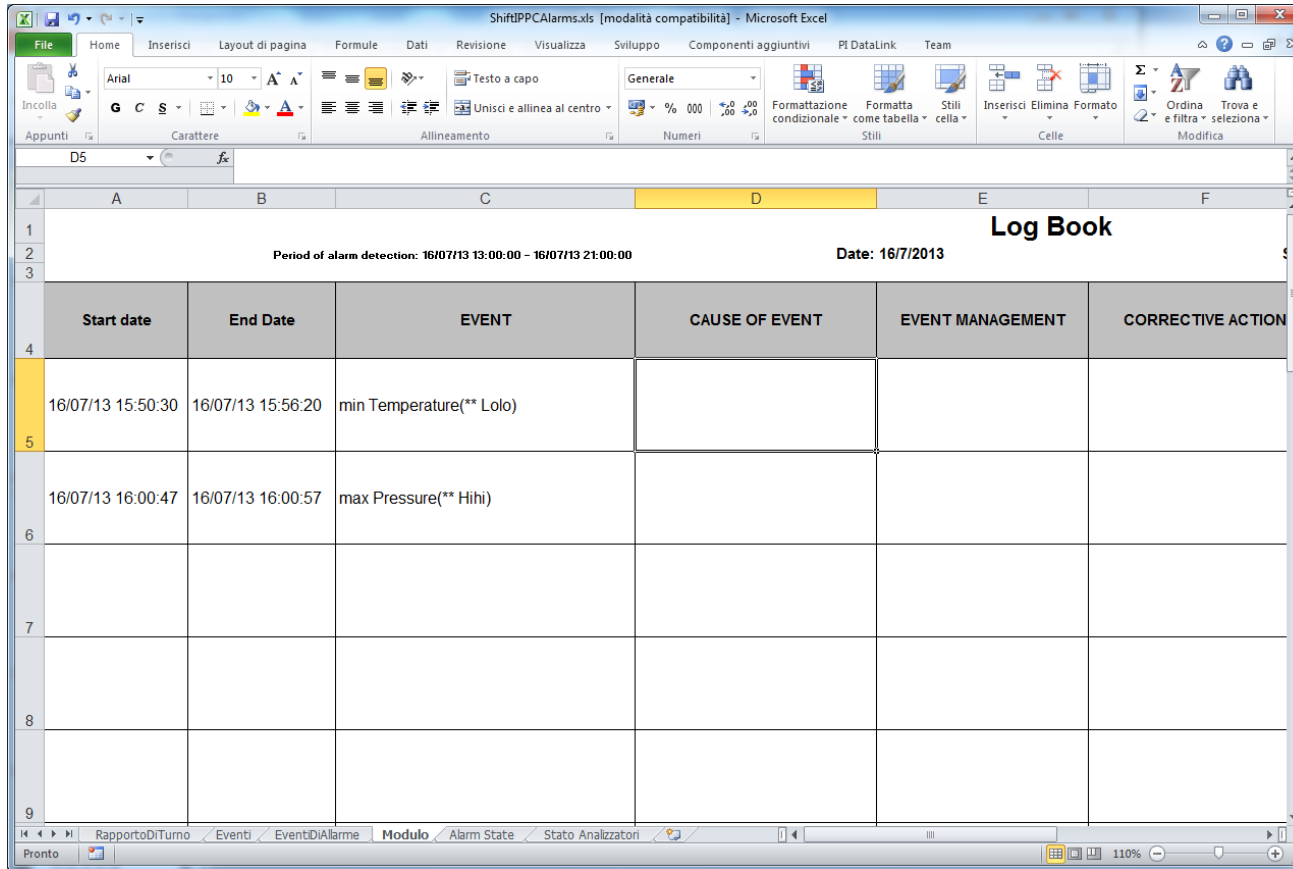
Pronto

Main MS Excel Book for Notification and Reporting.

Shift browsing (back/forth) buttons

Alarm Status currently and during the selected shift

PI DataLink



ShiftIPPCAlarms.xls [modalità compatibilità] - Microsoft Excel

File Home Inserisci Layout di pagina Formule Dati Revisione Visualizza Sviluppo Componenti aggiuntivi PI DataLink Team

Period of alarm detection: 16/07/13 13:00:00 - 16/07/13 21:00:00 Date: 16/7/2013

Start date	End Date	EVENT	CAUSE OF EVENT	EVENT MANAGEMENT	CORRECTIVE ACTION
16/07/13 15:50:30	16/07/13 15:56:20	min Temperature(** Lolo)			
16/07/13 16:00:47	16/07/13 16:00:57	max Pressure(** Hihi)			

RapportoDiTurno Eventi EventDiAllarme Modulo Alarm State Stato Analizzatori

We got the list of all alarm events in the selected shift.

Each event must be justified and discussed with process engineers to find out the reasons of abnormal behaviour.

PI DataLink + PI BatchView

Batch_IPPC.xls [modalità compatibilità] - Microsoft Excel

File Home Inserisci Layout di pagina Formule Dati Revisione Visualizza Sviluppo Componenti aggiuntivi PI DataLink Team

Current Value Single Value Archive Value Multiple Value Compressed Data Timed Data Sampled Data Calculated Data Filtered Calculation Search Properties Update Settings Insert Trend Point ID to Tag Attribute Mask to Tag Property to Value Module Browse Alias to Tag Module Database

B83

Temperature under control

16/07/2013 12:49

Year: 2013
Limit: All
Min Length (min): 1

TOTALS
EVENTS 11
Hours 5

Filter:

Data inizio: 01/01/2013 06:00
Data fine: 01/01/2014 06:00

Parameters: Temperature under control

Unit: TT:TempControl °C

Measure TT:TempControl

Alarm TT:TempControl.ALARM

Current Limit: > 98.0

Filter (minutes): 1

Dead band:

Tolerance over Min: 0.00

Tolerance over Max: 0.00

Lim.Min	TMin	Lim.Max	TMax	Val	Start time	End time	Time(days hh min) Hours	Month	Month	1
98.0				94.80	14/07/2013 17:16:00	14/07/2013 17:52:00	0 00 36 0.6	7	# Events	0
98.0				96.70	14/07/2013 09:32:00	14/07/2013 09:43:00	0 00 11 0.2	7	Tot.Hours	0.0
98.0				95.30	13/07/2013 18:07:00	13/07/2013 19:21:00	0 00 14 0.2	7		
98.0				96.60	13/07/2013 03:35:00	13/07/2013 03:35:00	0 00 11 0.2	7		
98.0				96.40	12/07/2013 16:59:00	12/07/2013 16:59:00	0 00 22 0.4	7		
98.0				95.50	12/07/2013 06:21:00	12/07/2013 06:21:00	0 00 09 0.1	7		
98.0				94.00	11/07/2013 14:45:00	11/07/2013 14:45:00	0 00 05 0.1	7		
98.0				95.00	11/07/2013 04:15:00	11/07/2013 04:15:00	0 00 15 0.3	7		
98.0				96.00	10/07/2013 18:10:00	10/07/2013 18:10:00	0 00 10 0.2	7		
98.0				96.50	10/07/2013 14:30:00	10/07/2013 14:30:00	0 00 30 0.5	7		
98.0				97.00	10/07/2013 09:30:16	10/07/2013 11:21:37	0 01 51 1.9	7		

Current year

Calculate

Month	N. of Events
1	0
2	0
3	0
4	0
5	0
6	0
7	11
8	0
9	0
10	0
11	0
12	0

Filter on Year and
Length of Time

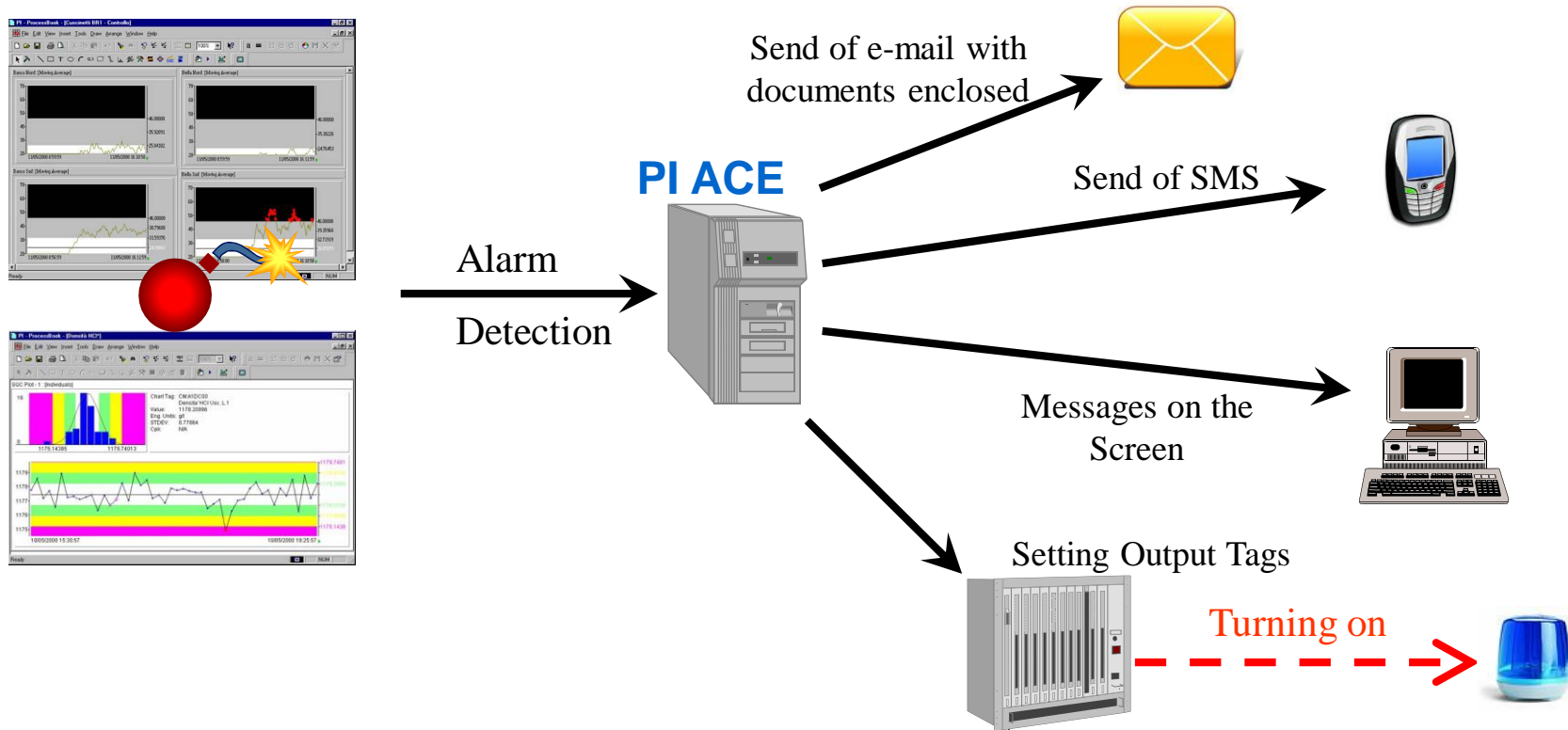
We use some
reports to look at all
events passing
thresholds for any
possible length of
time.

Parameter
under control

Results

Summary
per month

Notification means



We built our PI ACE application when PI Notifications did not exist

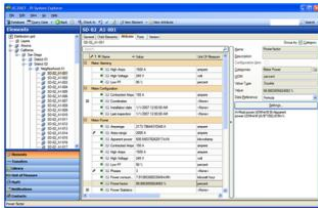
PI System as an Aid in the Emergency



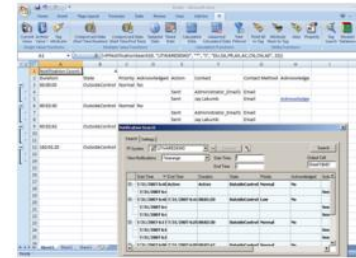
RAS is an Italian acronym for Factory Alarm Network, a computer system used to help communication in emergency situations

Based on an old version of Gensym-G2

Migrating towards PI system



Exploring PI AF/Event Frames + PI Notifications...



Emergency call for gas, fire. Main actors.

Plant of the accident



They inform the sentry post and the fire brigade (via RAS or by phone)

Sentry post



They inform auxiliary firemen and check acknowledgements

Control rooms

They acknowledge the alarm and follow given instructions



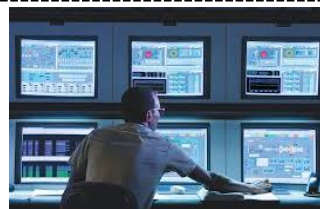
Fire brigade

They acknowledge the alarm and reaches the place of the accident.



Operational Center

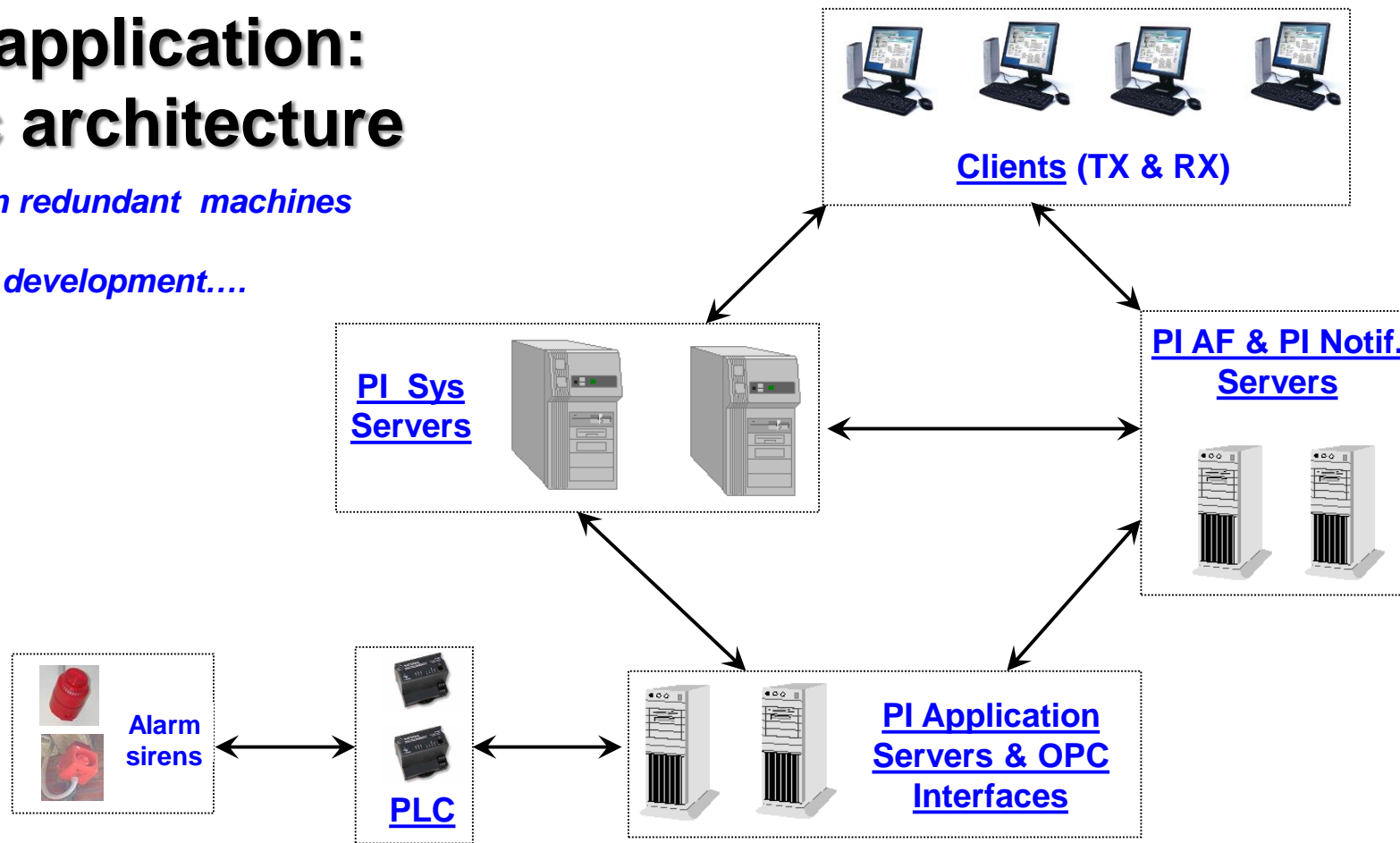
They make supervision and declare the end of the emergency. If necessary they inform local authorities.



RAS application: basic architecture

Based on redundant machines

In development....



Business is real time.

**Safety is our first part
of the business...**

Michele Albicocchi

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Industrial IT Supervisor

Solvay Chimica Italia S.p.A.

THANK YOU

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