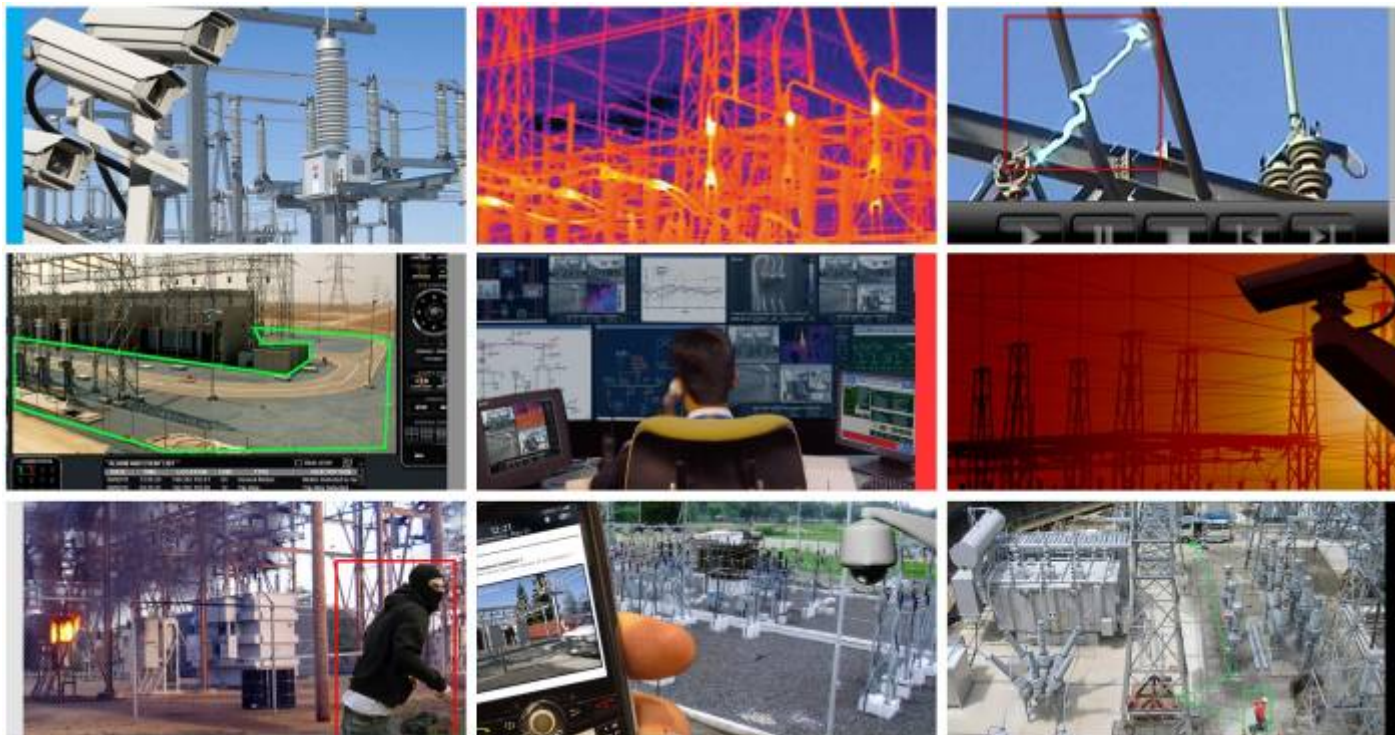


Video and the Smart Grid

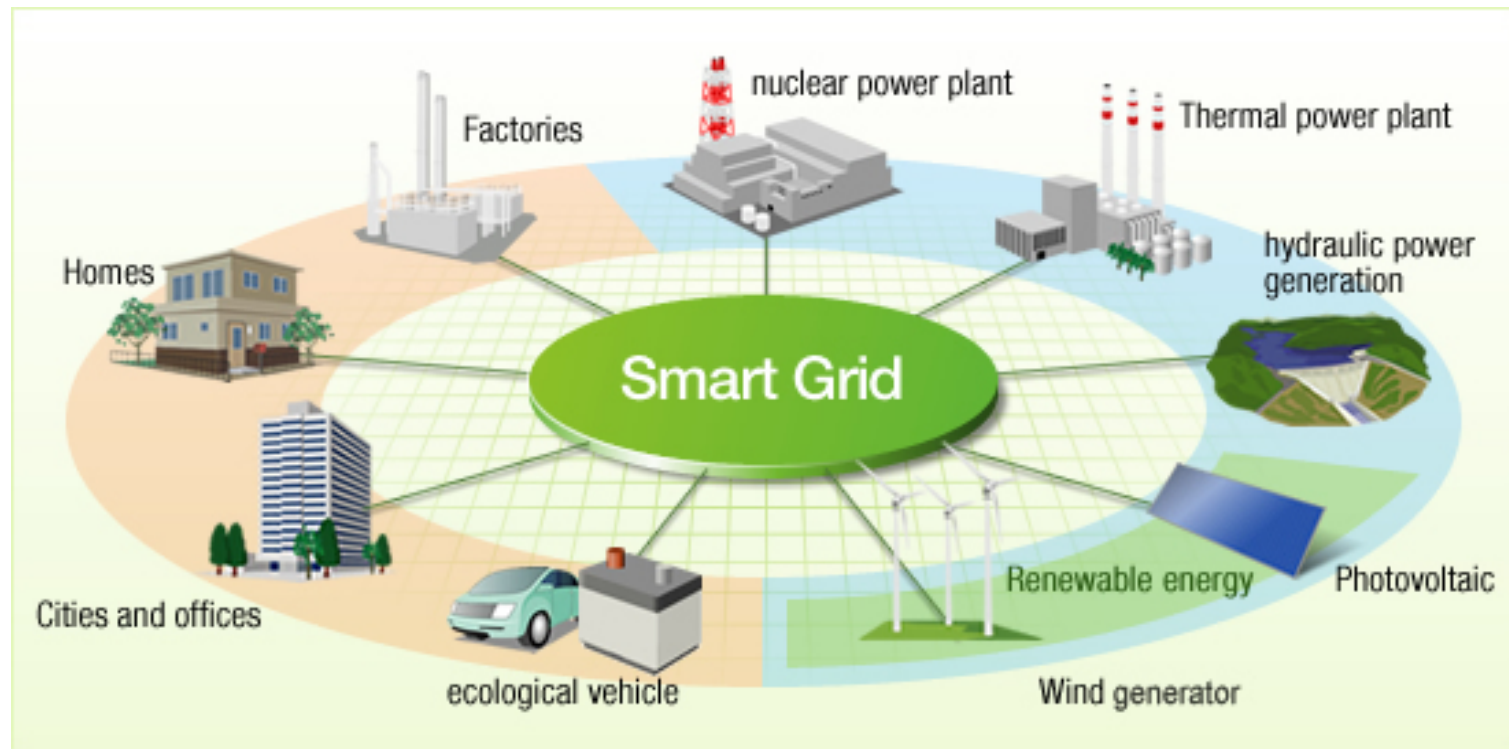


Anselm Viswasam P.Eng
Director of Business Development
Systems With Intelligence

Agenda

- Smart Grid – Enabling Video (Imaging)
- Challenges of video in the substation
- An Introduction to Imaging
 - Security
 - Substation Automation
 - Asset Management / Asset Health
- Video and the Smart Grid

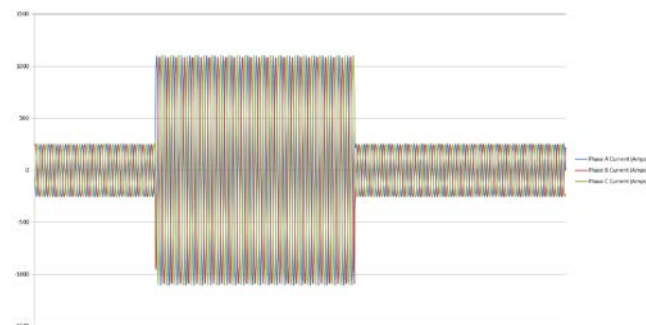
The Smart Grid



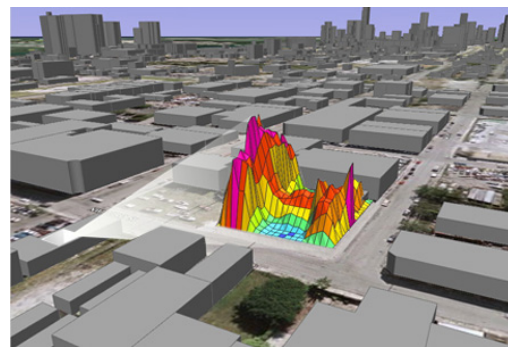
The merging of communications onto the power grid enables video – this allows us to focus on the capabilities of the video itself

Video Monitoring – The Challenges

Substation Activity - 3 Phase Fault

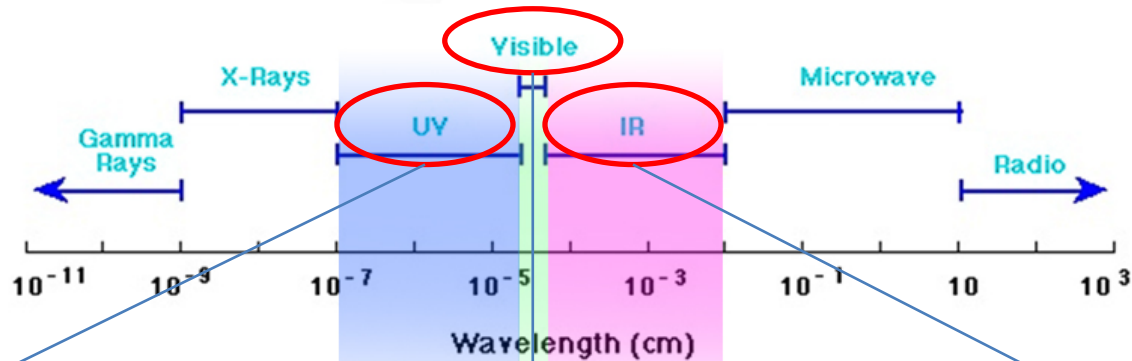


Substation Activity - EMI



An electric utilities' remote sites are complex animals and understanding the beast is key to taming it

Introduction to Imaging



- Security
- Asset Management
- Substation Automation
- Predictive Failure

- Security
- Substation Automation

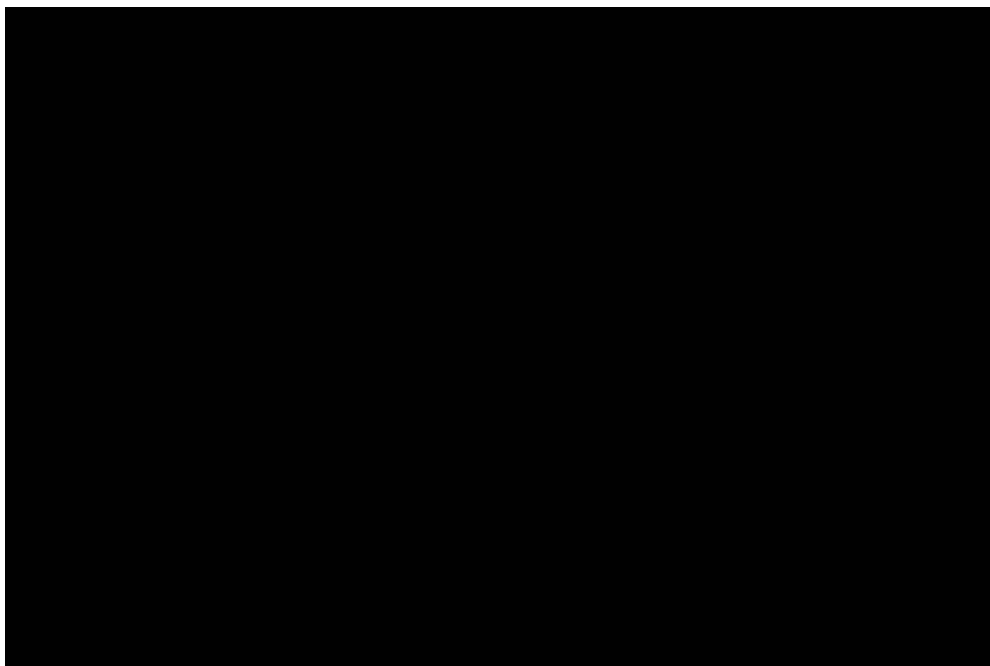
- Security
- Asset Management
- Substation Automation
- Predictive Failure

When we open our minds to the concept of Imaging the Video Camera simply becomes a housing for a sophisticated sensor

Quick ... find the security breach!



Image Analytics – the security perspective

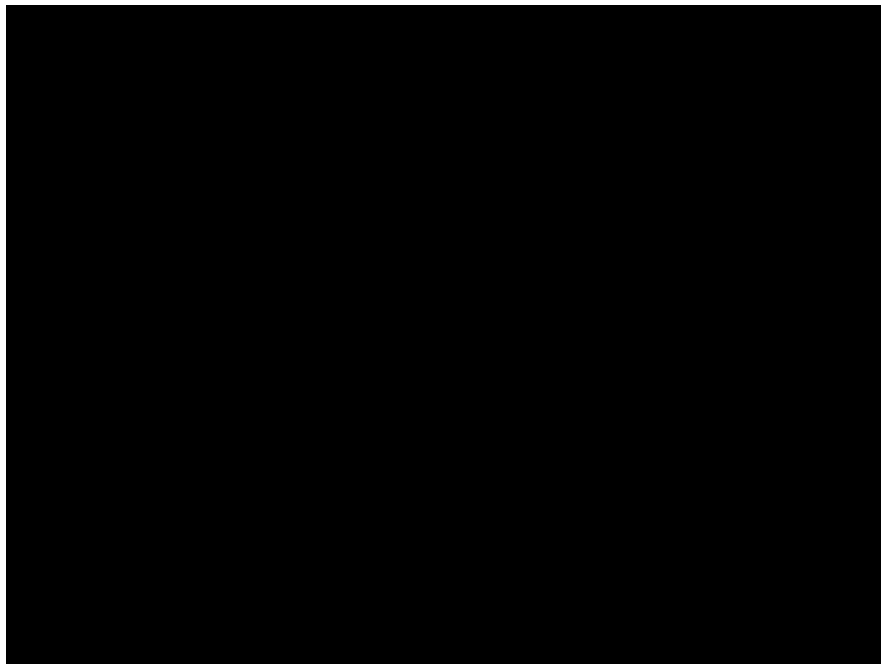


- Motion Detection
- Virtual Tripwire
- Loitering
- Camera Tampering

Example of Video Analytics in Action

Image analytics are a useful tool in assisting security operators

Image Analytics – Substation Automation 1



Example of Substation Automation Analytics in Action

- Motion Detection
- Virtual Tripwire
- Arc Flash Detection
- Breaker Failure

Imaging as a new tool in substation automation

Image Analytics – Substation Automation 2

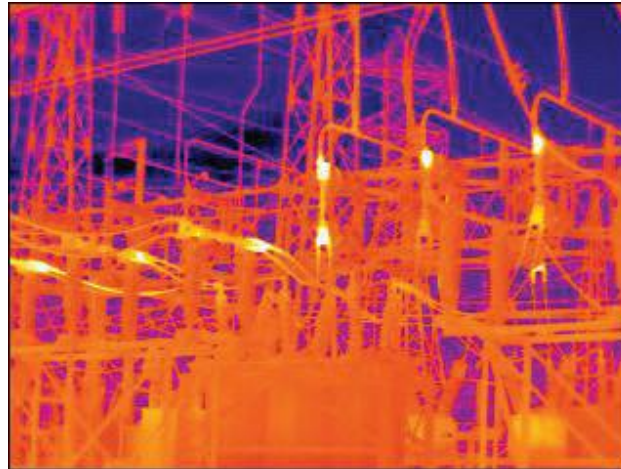


Event Recorder

1. SWI DVS picks up on door opening (light)
2. SWI DVS picks up on motion (person entering the control room)
3. SWI SDVS outputs a digital output
4. Protection relay receives digital output from SWI DVS as a Digital Input
5. Protection relay processes Digital Input and produces a protection settings group change
6. Timer
7. SWI DVS picks up on motion (person leaving the room)
8. SWI DVS releases Digital output to Protection relay when person leaves the room
9. Protection relay processes Digital Output dropout and produces a protection settings group change (back to original setting)

Using imaging to elevate the functionality of your existing IED's

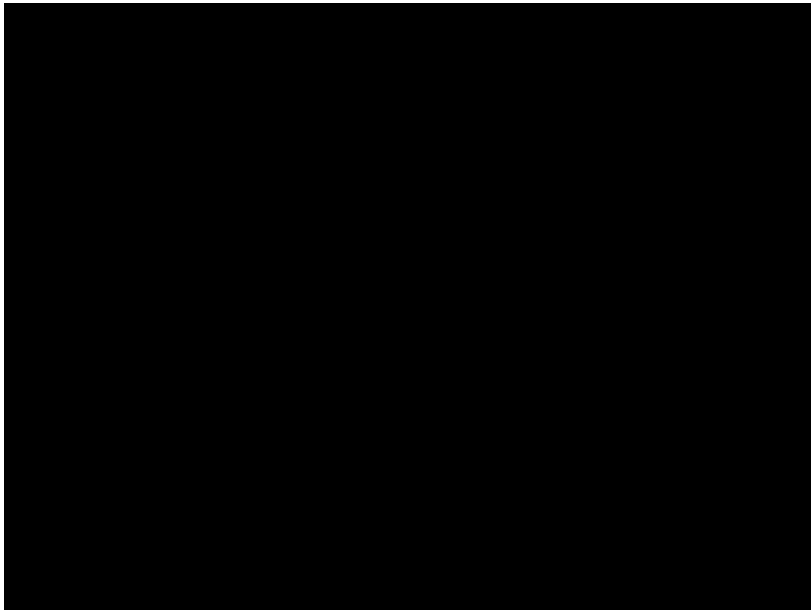
Asset Management - Infrared Imaging



- **Power transformers**
(oil levels and pump operation)
- **Load tap changers**
(oil levels other internal problems)
- **Insulator bushings**
(oil levels and bad connections)
- **Standoff insulators**
(moisture, contamination, degradation)
- **Lightning arrestors**
(degradation of metal oxide disks)
- **Circuit breakers (oil)**
- **Mechanical disconnects**
(bad connections, contamination)
- **Batteries**
(electrolyte levels, bad connections)

For drive by shootings to be 100% effective – better if target is already dead!

Asset Management – Predictive Failure Analysis



- Monitoring
- Diagnostics
- Correlation
- Historian

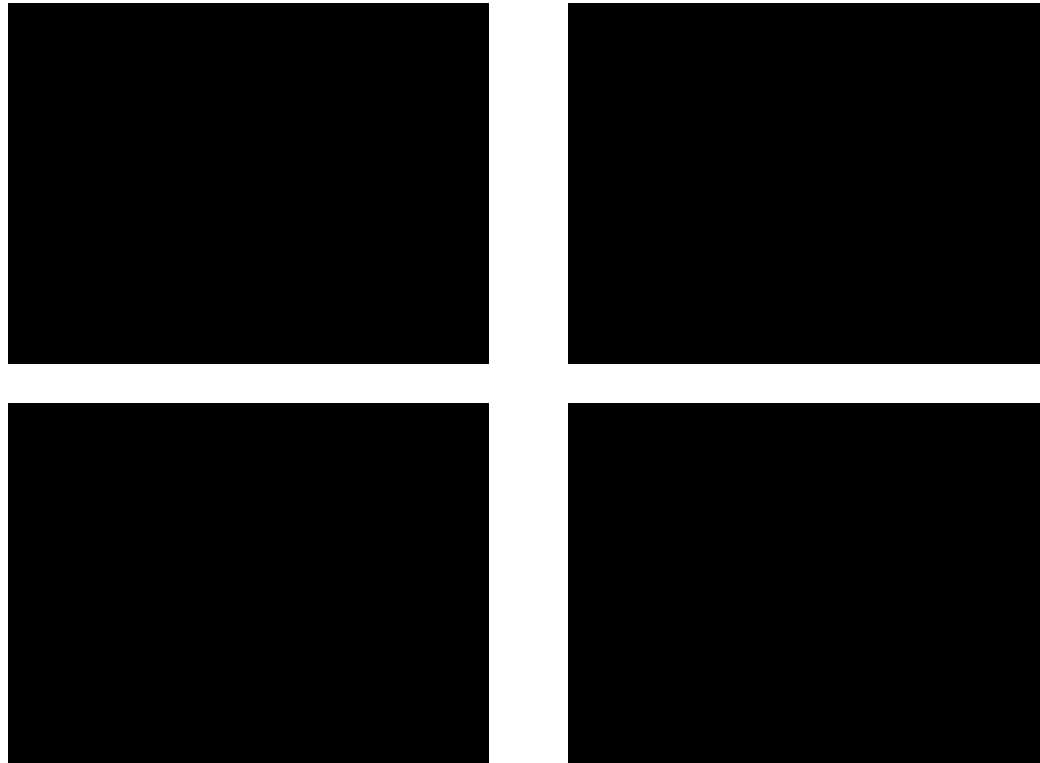
A new lease on life in the Pre Fault world

Smart Grid - 2011



Today's control room displays the grid as an electrical representation of power system flow only

Smart Grid – 2013 and beyond



A more comprehensive view of the grid

Summary

- Video is simply the capture of images
- Cameras are simply housings for imaging sensors
- If we focus on the sensors then the perspective changes
- Imaging is now applicable for
 - Substation security
 - Maintenance and diagnostics
 - Asset health and management
 - Reporting of pre fault (failure)
 - True and complete representation of the grid

How Smart is your smart grid system if you cannot actually see the grid?

Q & A

Thank You

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