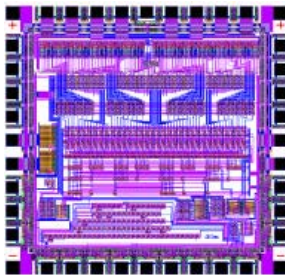
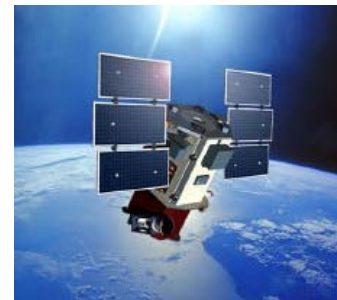
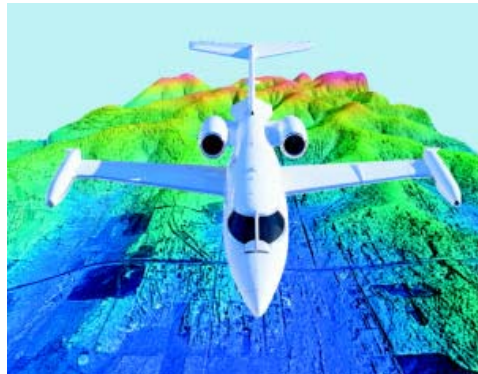
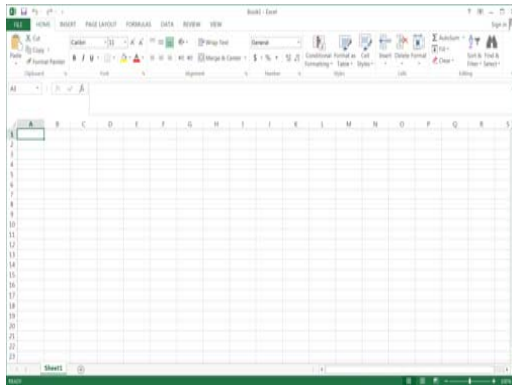


Relay Settings Automation

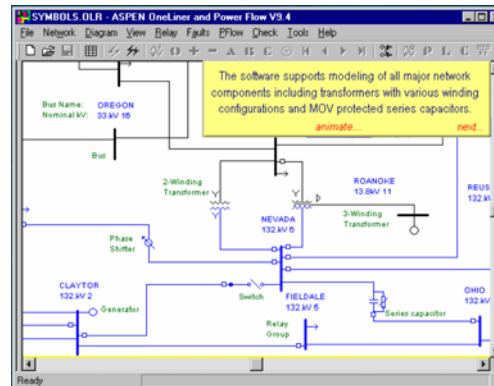


Tommy Morris
Associate Professor
March 26, 2015

Relay Settings Automation (RSA)



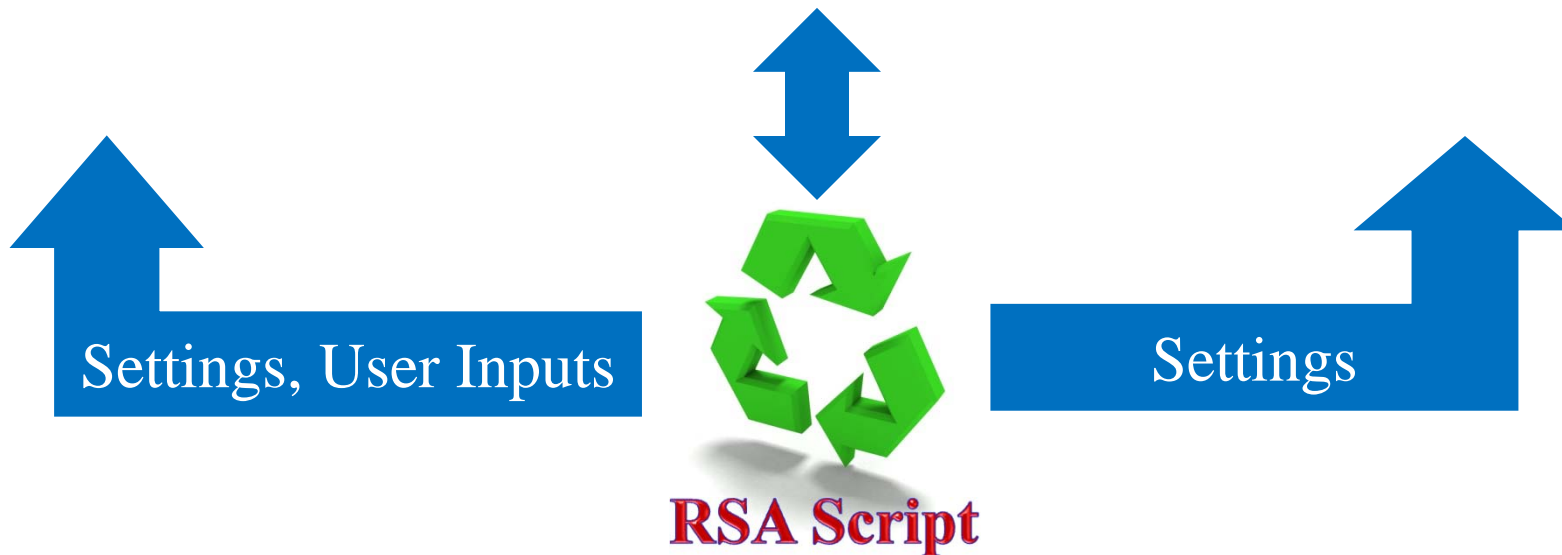
calculation spreadsheet



Aspen Onliner

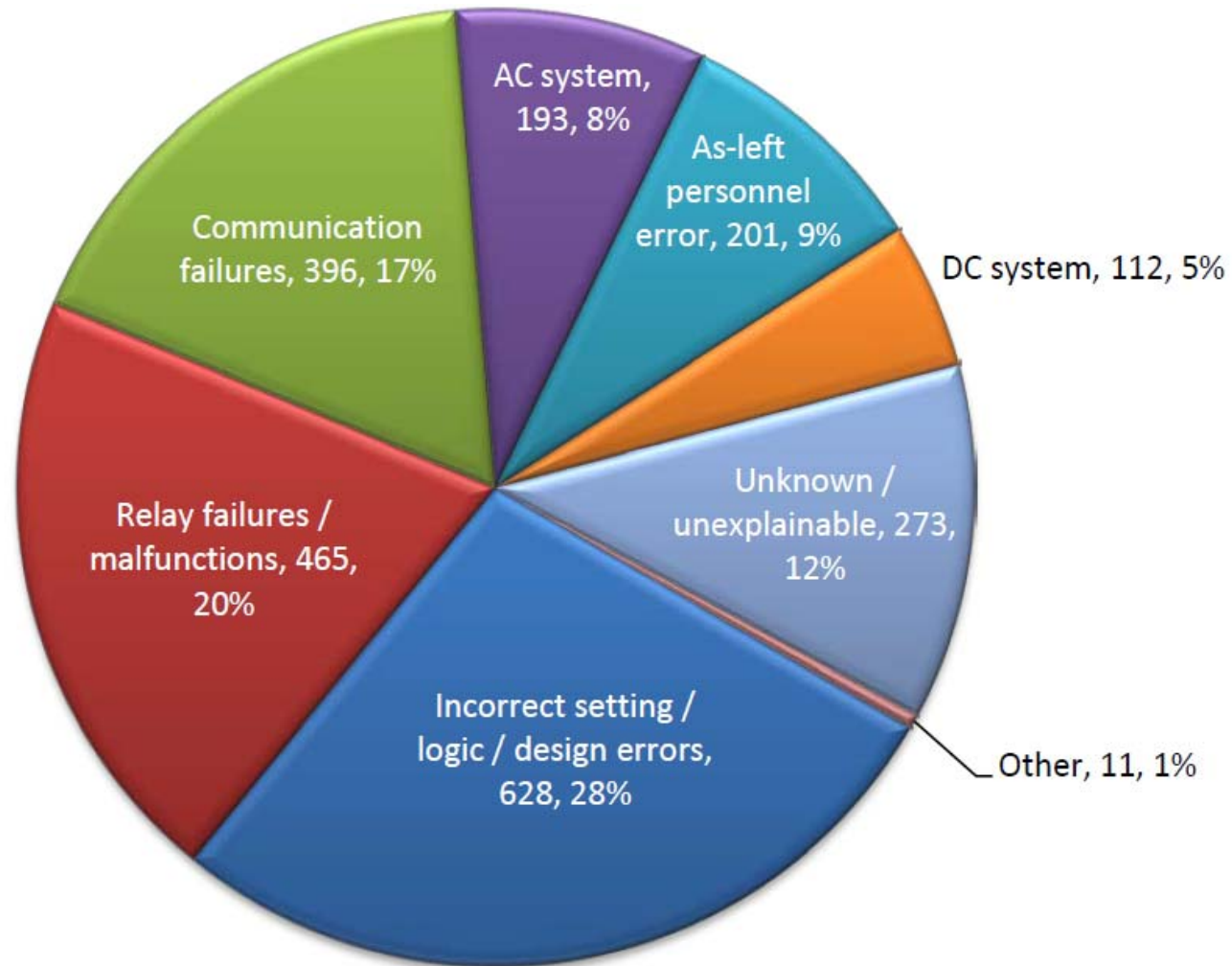


Relay Settings Database



Team Members

- Dan Glaser – Relay Settings, Entergy
- Tom Field – Transmission Design Basis, Entergy
- Tommy Morris – Mississippi State University
- Mike Mazzola – Mississippi State University



Misoperations Report. Protection System Misoperations Task Force. NERC. April 1, 2013.

Traditional relay setting philosophy

- The Art and Science of Protective Relay Setting
 - The Art is a flexibility between engineers that does not ensure consistency
 - The Science is a fixed methodology
- The issue of Consistency can only be resolved if:
 - The Art is converted to a Science
 - The rules of the Science are defined

Elimination of human error

- Not understanding Philosophy
 - Define the Rules for the Philosophy
- Undefined Rules for Special Cases
 - Define the Rules for the Majority of the Special Cases
- Mathematical errors
 - Automate the Calculations with a spreadsheet or a program
- Typing errors
 - Automate all steps that require typing of numbers

Benefits of Relay Setting Automation

- Eliminate Human Error from Number Copying
- Standardize how and what data is obtained (consistency)
- Reduce time to set relays
- Documentation of what was performed

RSA 2014 Accomplishments

- Released 2 versions
 - v1.0 – June 2014
 - v1.1 – Sept 2014
- Entergy relay settings engineers and contractors use RSA for all new projects

RSA Features

- Collect offline information
- Collect information from model
 - Second lines, transformers, line impedances, taps, breakers, etc.
- Parse Circuit
 - Build list of needed fault simulations
 - Create outage list
- Fault simulations
- Infeed calculations
- Find strongest sources
- Write RDB file
- Log intermediate results/document settings process

Upcoming RSA Features

- Breaker Failure Simulation
- Coordination checks and settings changes

Next Steps

- A Consortium is being setup to modify the MSU/Entergy RSA process for other utilities
- More standardization in the industry will allow more sharing of automation methods

How to join RSA consortium

- Contact:
 - Tom Field at tfield@entergy.com with email expressing interest
 - Participate in the next RSA Consortium Call

Student Impacts



Joined Entergy full time in The Woodlands, Jan 2015.

Travis Green (CPE)



Graduates May 2015. Accepted position at MidSouth Utility Consultants.

Joseph Johnson (EE)



Interned at Entergy in summer 2014. Graduates May 2015.

Stefan Lewis (CPE)



Applying for Entergy 2015 summer intern positions.

Grant Abbey (EE)