Simulation & Black Swan: Prevention & Mitigation of Crises

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Lets look at some Examples…

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Black Swan Theory *by Nassim Nicholas Taleb*

The disproportionate role of high-profile, hard-to-predict, and rare events that are beyond the realm of normal expectations in history, science, finance, and technology.

The non-computability of the probability of the consequential rare events using scientific methods (owing to the very nature of small probabilities).

The psychological biases that blind people, both individually and collectively, to uncertainty and to a rare event's massive role in historical affairs.

Lets look at some Examples…

Ten principles for a Black Swan-proof world

- What is fragile should break early while it is still small.
- No socialisation of losses and privatisation of gains.
- People who were driving a school bus blindfolded (and crashed it) should never be given a new bus.
- Do not let someone making an "incentive" bonus manage a nuclear plant – or your financial risks.
- Counter-balance complexity with simplicity.
- Do not give children sticks of dynamite, even if they come with a warning.
- Only Ponzi schemes should depend on confidence.
- Do not give an addict more drugs if he has withdrawal pains.
- Citizens should not depend on financial assets or fallible "expert" advice for their retirement.
- Make an omelette with the broken eggs

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Lets look at some Examples…

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New Frontiers &…

There are Sharks in these waters?

Yes, there are Sharks in all Seas!

Cyber is … Everywhere

88 Shark Attacks *World/year*
5 deaths in 2017

230'000 Malware produced by day
77'183 Cyber Severe Damages
Cyber Insurance Premiums 1.3bUSD
Cyber Security Gov.Budget 28bUSD
…just USA …already 3 years ago

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…New Engineers

September XIII, 2018, 0607 Z

Cyber Attacks are able to disable official websites and networks, disrupt or disable essential services, steal or alter classified data and cripple strategic assets & critical infrastructures such as Communications, Power, Transportations, Finance, Health Care.

Cyber Attacks are addressing both **Civil** and **Military Targets**

Cyberwarfare is a Cyber-based Conflict involving motivated attacks on information and information systems.

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Big Data are a resources also for Attackers in Cyberspace

- **Yahoo 2013 & 2014, Over 1 billion accounts**
- **TJX, 2003, 45.7 million credit/debit cards, driver's licenses**
- **FriendFinder, 2016, 412 million accounts on dating**
- **Ebay, 2014, 145 million accounts**
- **Heartland Pay.Syst, 2008/2009, 130 million credit cards**
- **Target Stores, 2013, 110 million records compromised**
- **Sony OE., 2011, 102 million records compromised**
- **Anthem, 2015, 69 million health insurer records**
- **Home Depot, 2014, 56 million credit and debit cards 10.5 GUSD (~194 USD/card)**
- **LinkedIn, 2012, 6.5 million accounts (4%), password cracking in 72h for 90% cases**

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It is not necessary to attack your PC or Mobile…

… new Kitchen Appliance provide new vulnerabilities:

- **To get your Google Account by MiMT from a Fridge able to propose you the Google Calendar (2015)**

- **To generate a Junk Mail Campaign spamming 750'000 emails from 10'000 Home Devices (2014)**

- **To watch your home from Always On Camera from Smart TV (2015)**

MiTM Man in The Middle   Dsniff Dug Song Sniff through SSH & HTML by MiTM

Smarty Federal Trade Commission

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# New Frontiers &…
…New Engineers

- **Estonia, April 26-May 23, 2007, DDS, Botnet, Ping floods: All Government, 2 Banks, Political Parties, No Parliament Email, No Credit Cards, no ATM**
- **Georgia, August 7-12, 2008, DDS, Botnet, Web Defacement, Sql Injections, Spamming: News and Government Websites Down, Gov.Comms down with the World, Banks & Cell Phones down.**
- **Kyrygistan, January 18-31, 2009, DDS, ¾ IPS down, 80% internet down, mobile down**
- **Ukraine, 2015/2017, SCADA,Blackouts 1/million People 2h**

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…New Engineers
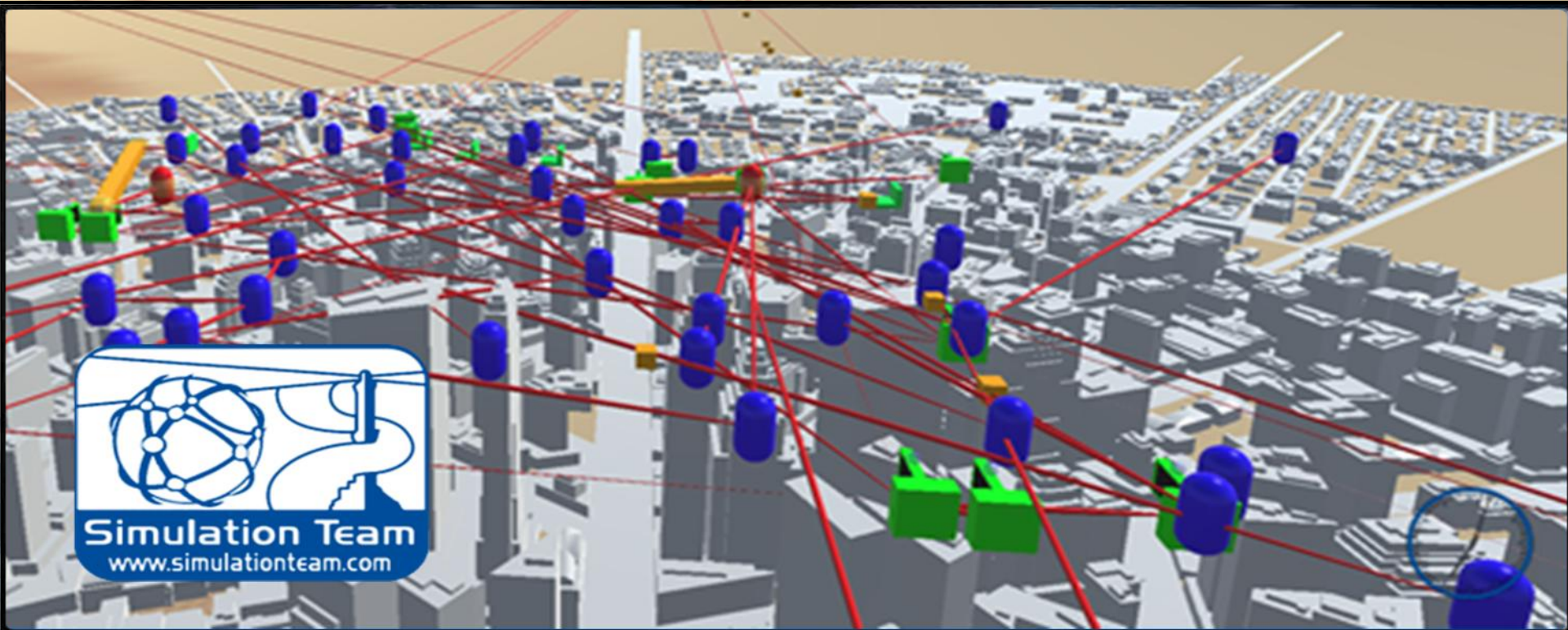
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Cyber Domain: adding Spices to T-REX

Threat network simulation for REactive eXperience

The Cyber Security is part of T-Rex environment and allows to evaluate the impacts on operations and estimates their magnitude This approach allows to considerate the Cyber Domain Complexity and the impacts on ICT process and infrastructures as well as Social Engineering elements. The MS2G (Modeling, interoperable Simulation & Serious Games) approach, make possible to raise users awareness and improve performance reducing vulnerabilities
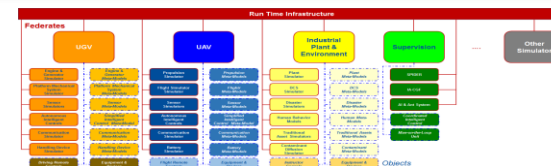
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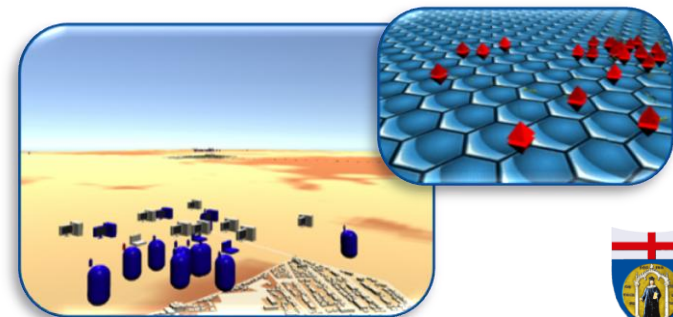
UxV & Plants…
…and more!

Inspection Outside

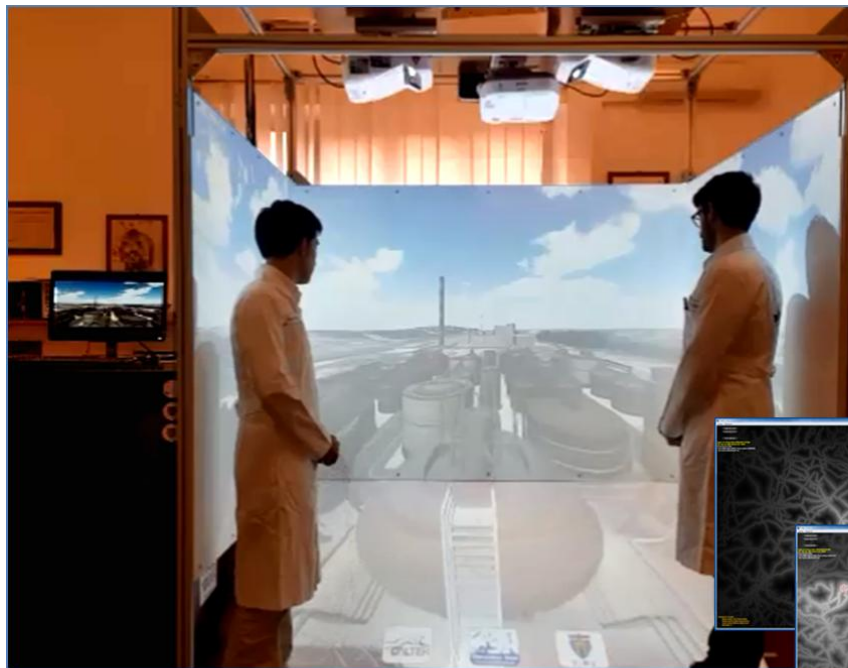**Inspection Inside**

Safety First

UxV Unmanned any domain Vehicle
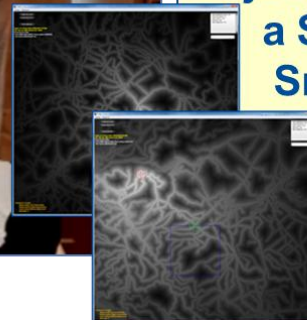
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AI & Man on the Loop vs. Man in the Loop

Humans need new ways to interact with Intelligent Systems.
Today we need to pass from driving and piloting a single UAV to assigning high level task and objectives to a Wing or a Swarm of Uxv.
Smart Simulation allows to Design, Experiment & Test these new Solution
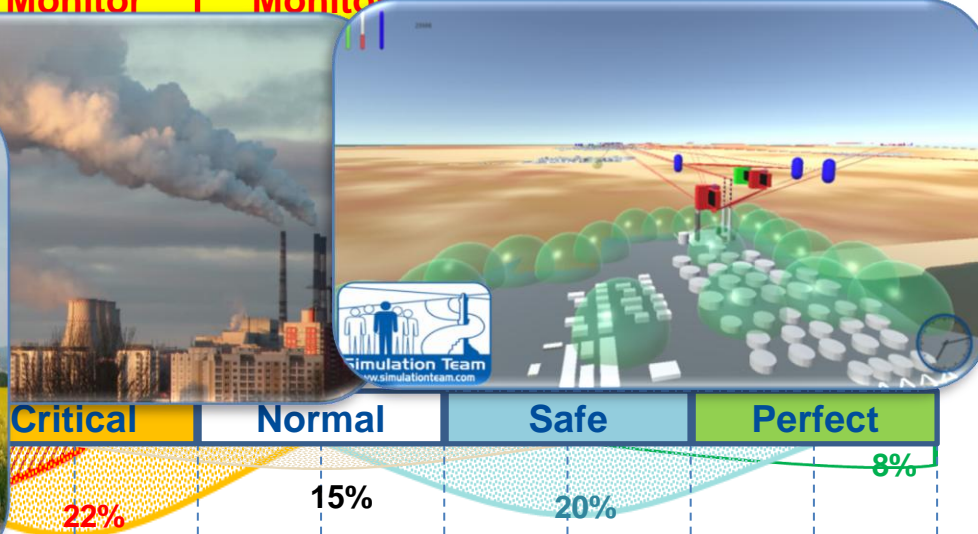
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AI… Artificial Intelligent for Awareness driven Initiatives

Danger	31.5%
Inspect	35.2%
Monitor	23.3%
Stand by	8.0%

General Situation on the Plant

Activating "Very Strong" at –10%

Symptoms *from Sensor*

Ref Values

	Very Strong	Strong				
	Alarm 31.5%	**Inspection 19.8%**	**Monitor 13.5%**	**Monitor 18.0%**	**Sand by 7.2%**
	Inspection	**Monitor**	**Monitor**	**None**	**Sand by**

Critical	**Normal**	**Safe**	**Perfect**
22%	**15%**	**20%**	**8%**

Mutual Relationship among Sensors & UxV

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MS2G supporting us during good times..

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…and during Crisis and Critical Conditions

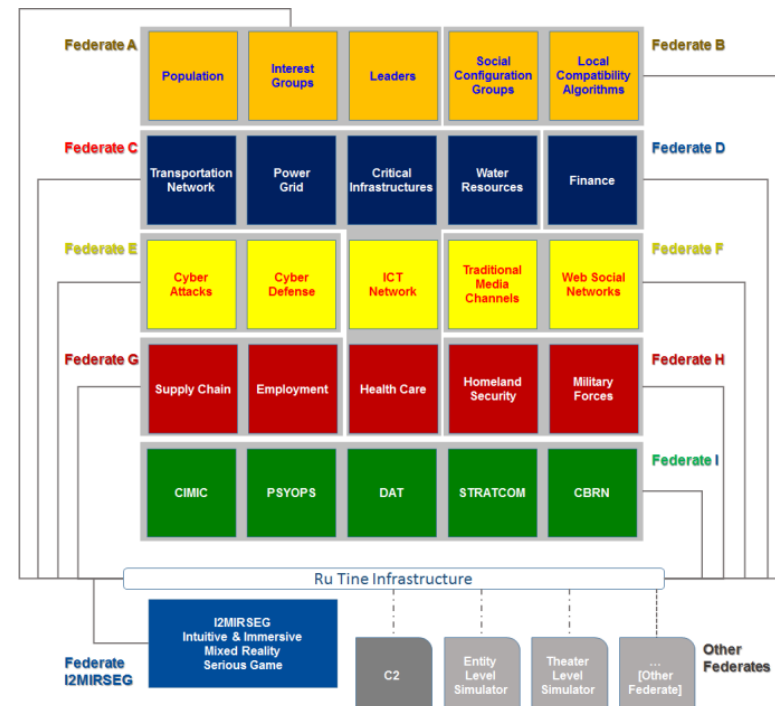**We need Smart Simulation in Engineering**

…because things are Changing!

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Hybrid Challenges & Autonomous Systems

Autonomous Systems represent crucial elements for Hybrid Challenges both in terms of available Resources and Threats The T-REX simulates towns, infrastructures, people, UxV as well as Cyber & Real coordinated actions that affect whole System

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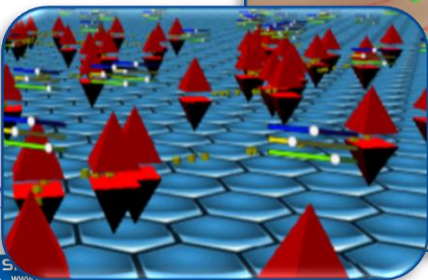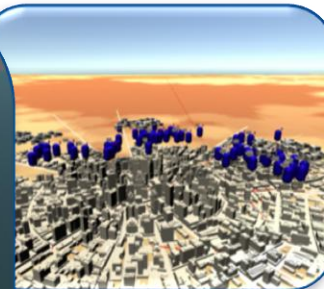
Creating Comprehensive Environments
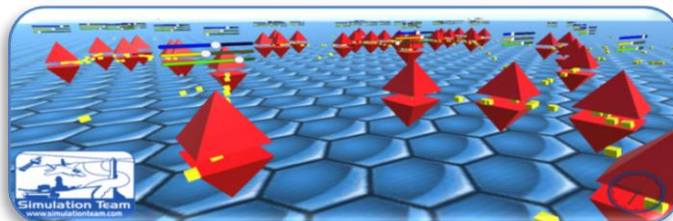
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Working on Real Virtual Worlds

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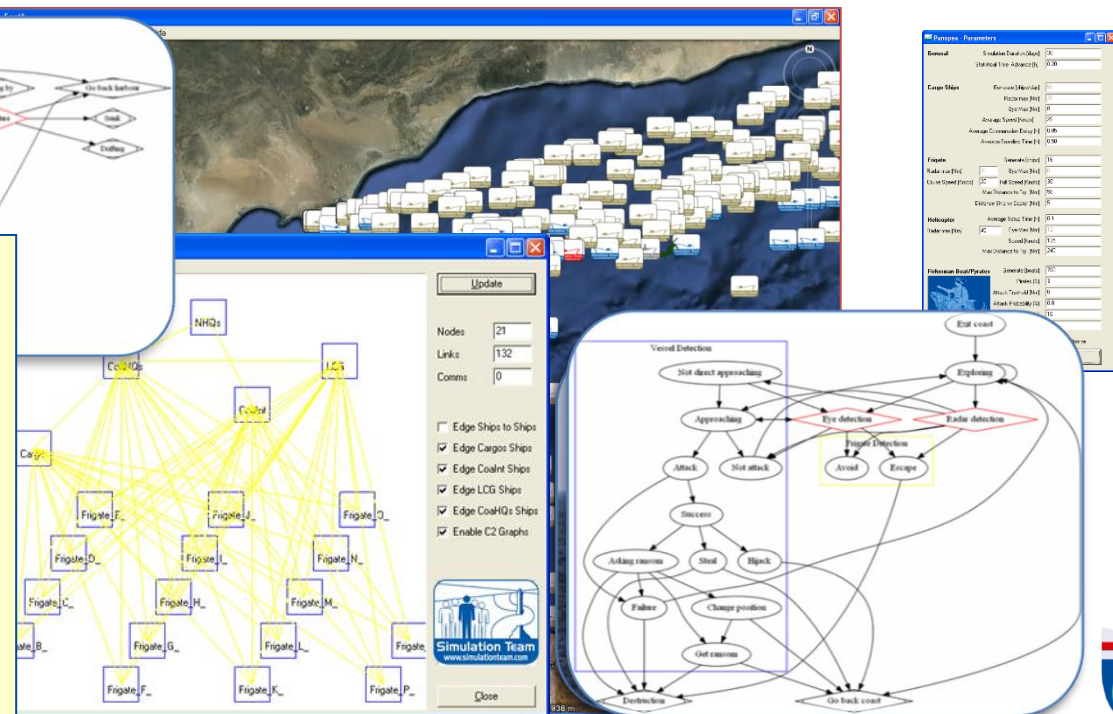# IA-CGF for Large Systems & Huge Interactions

PANOPEA (Piracy Asymmetric Naval Operation Patterns modeling for Education & Analysis) has been developed by Simulation Team to Simulate complex situations where traffic is so intense that is hard to Coordinate Operations and discriminate threats and alerts

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Haiti Humanitarian Support Demonstration

The demonstration was devoted to show the potential of interoperability in combining different simulators for full coverage of a complex problem such as that one of Haiti. Simulation Team was involved by using his interoperable IACGF reproducing Population Behavior, Human Factors (famine, stress, diseases, fear, aggressiveness), Riots and Gang Activities as well as the impact of the Simulation Earthquake

JTLS

JCATS

IA-CGF Riots

IA-CGF EQ

VBS2

DI-GUI

PLEXSIS

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