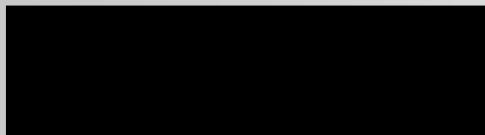


# HIDDENSALAMANDER

Alerting and Characterization of  
Botnet Activity in TURMOIL

Briefers:

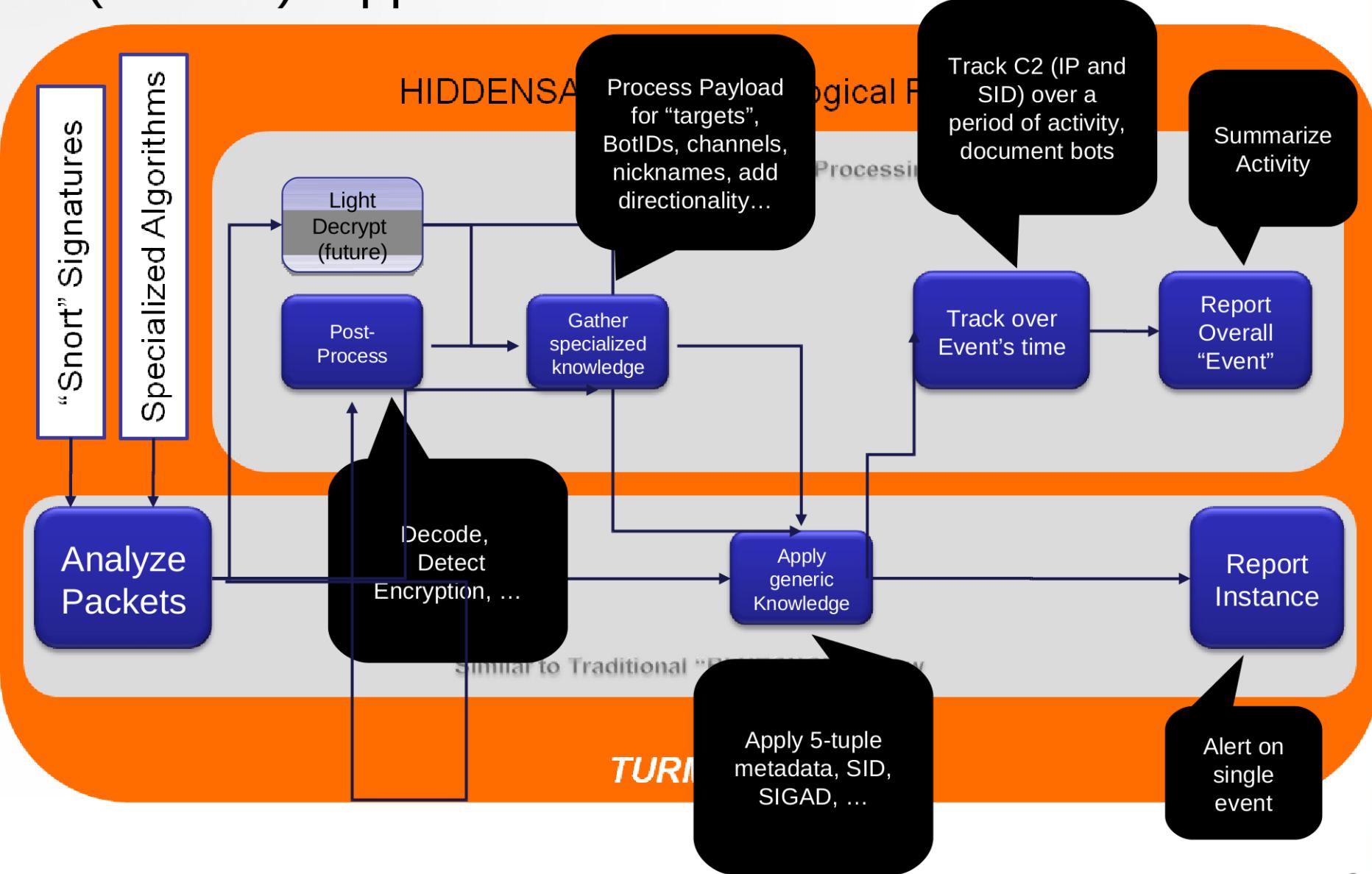


# (S//REL) High Level Goals

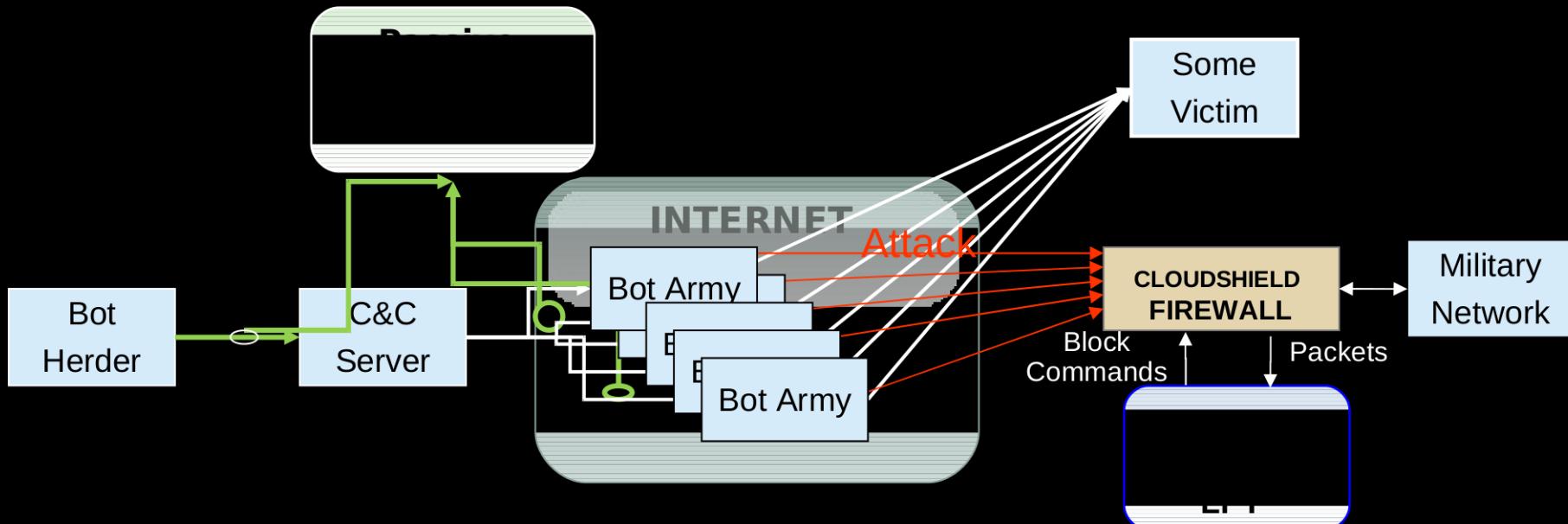
## ⌚ Detect (all!) botnet activity on our sensors

- Alert only when activity is relevant and time-sensitive
  - » Involves entities/commanding of high interest
  - » Involves protected areas
  - » Could initiate defensive action
- Generate metadata always
  - » Aids in attribution and retrospective analysis
- Enrich metadata as much as possible
  - » Alleviate the need for in-depth knowledge of actors or malware

## (S//REL) Approach



## (S//REL) Concept/Idea Behind It



- Support Attribution
- Association
- Discovery

# (S//REL) What we offer today

- An extensible botnet processing service
  - Capabilities are added via configuration or specialized processors
- The ability to track events spanning across 5-tuples
  - Enables production of Event Summaries and Enrichment
- Geographical dispersion
  - SIGINT perspective, currently at SCS sites and MHS (prototype)
- TURMOIL augments Defensive Efforts two fold
  - Early warning Tips for defensive action (to NETEZZA, then TUTELAGE)
  - Metadata for characterization and to support attribution (to GMPLACE and RONIN, then CYBERCLOUD and MARINA).

# (S//REL) Progress over the last year

## ○ Advancements

- Zeus RC4 encrypted processing flow
- Base64 decoding e.g. BEB v1.8 target IP extraction
- Limited Metadata Enrichment
  - » Case Study to support QBOT activities
- Deployment to F6 sites and a second system at MHS
- Established ASDF to GMPLACE for GHOSTMACHINE analytics
- Established flow to NETEZZA (TURQI) for validation
- Defined Botnet Lifecycle Model for categorizing enrichment metadata

# (S//REL) Current Development Focus

## ⌚ Attain analyst validation

- Ingest into GM and creating Views
- End-to-end dataflow validation

## ⌚ Improve Metadata Enrichment capabilities

- Define generic model to create metadata PCRE rules
- Refine Enrichment Model for Malware

## ⌚ Improvements to function as a framework/service

- Greater focus on metadata enrichment

## ⌚ Provide dynamic AEG tasking

## ⌚ Re-factor Tasking and Tips to fit botnets

- Update Tip format to closely align with extracted data

## ⌚ Add specialized packet processors

- Mariposa
- Looking for opportunities

# (S//REL) Future Work

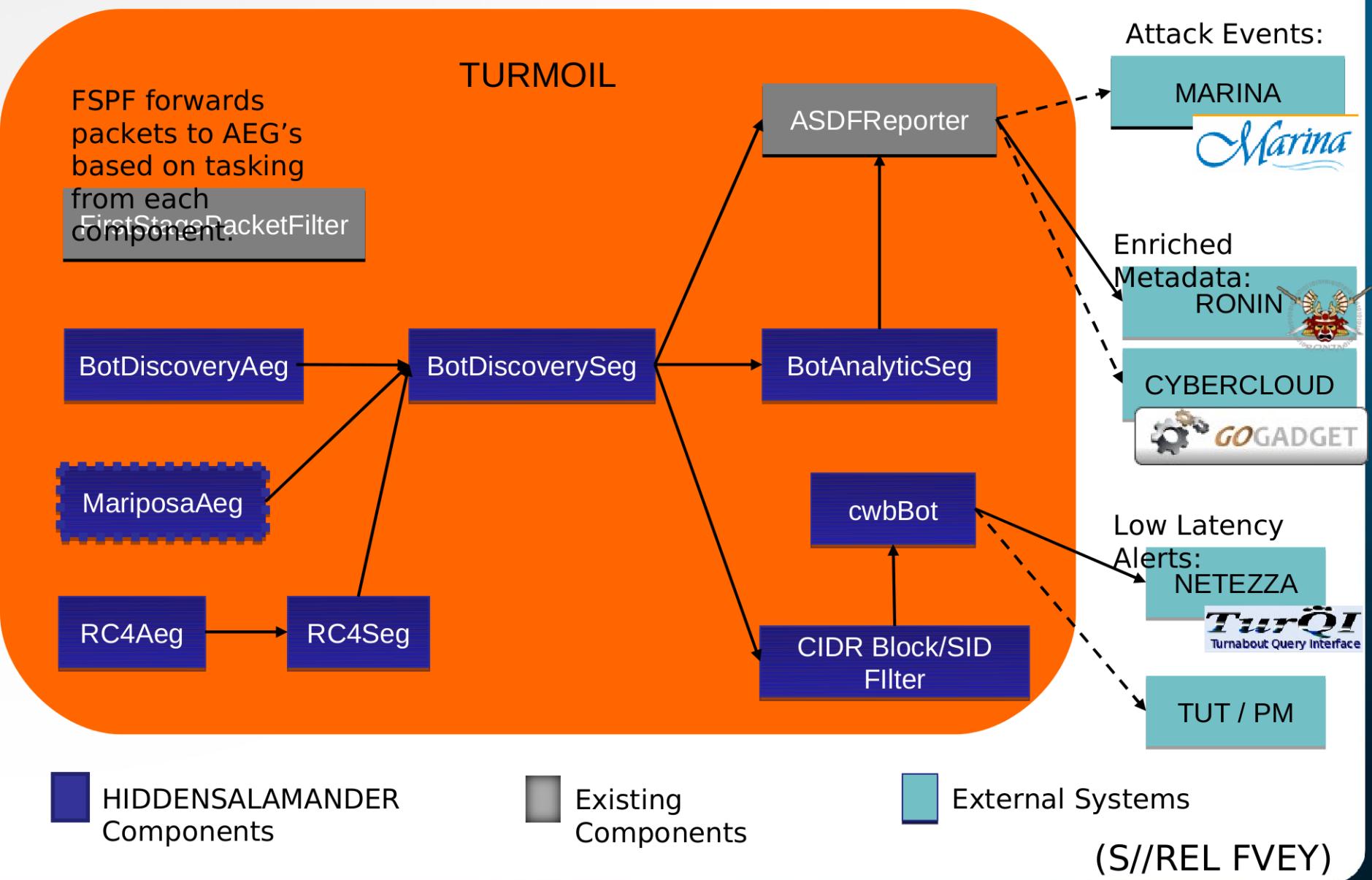
## ⌚ Initial development

- Initiate promotion (to XKS) or collection flows
- Re-factor SEG to make Metadata Enrichment more flexible
- Redesign the Analytic to provide more valuable Summaries
  - » Possibly detect point of origin of Herder commanding

## ⌚ Biggest Challenges

- Currently have no means to track peer-to-peer botnet activity
  - » May look to current TURMOIL Fast Flux capabilities for ideas
- Encrypted bots defeat most attempts at tracking and reporting
  - » Possible candidate for TURMOIL Re-Injection flow

## (TS//SI//REL) Current Implementation



# (TS//SI//REL) The Components

## ⌚ BotDiscoveryAeg

- Not A Snort based Application.
- Ingests translated Snort signatures and tasks the FSPF.
- Emulates Snort behavior as closely as possible.

## ⌚ RC4Aeg/RC4Seg

- Highly specialized components aimed at detecting RC4 Encrypted Zeus activity

## ⌚ MariposaAeg (Currently in development)

- Highly specialized – detects and decodes a particular encoding.

## ⌚ BotDiscoverySeg

- De-dups on SID/5 Tuple for Tipping and MARINA.
- De-dups on SID/IP/Port for BotAnalyticSeg.

## ⌚ BotAnalyticSeg

- Summarizes Event Metadata from BotDiscoverySeg.
- Provides metadata to RONIN.

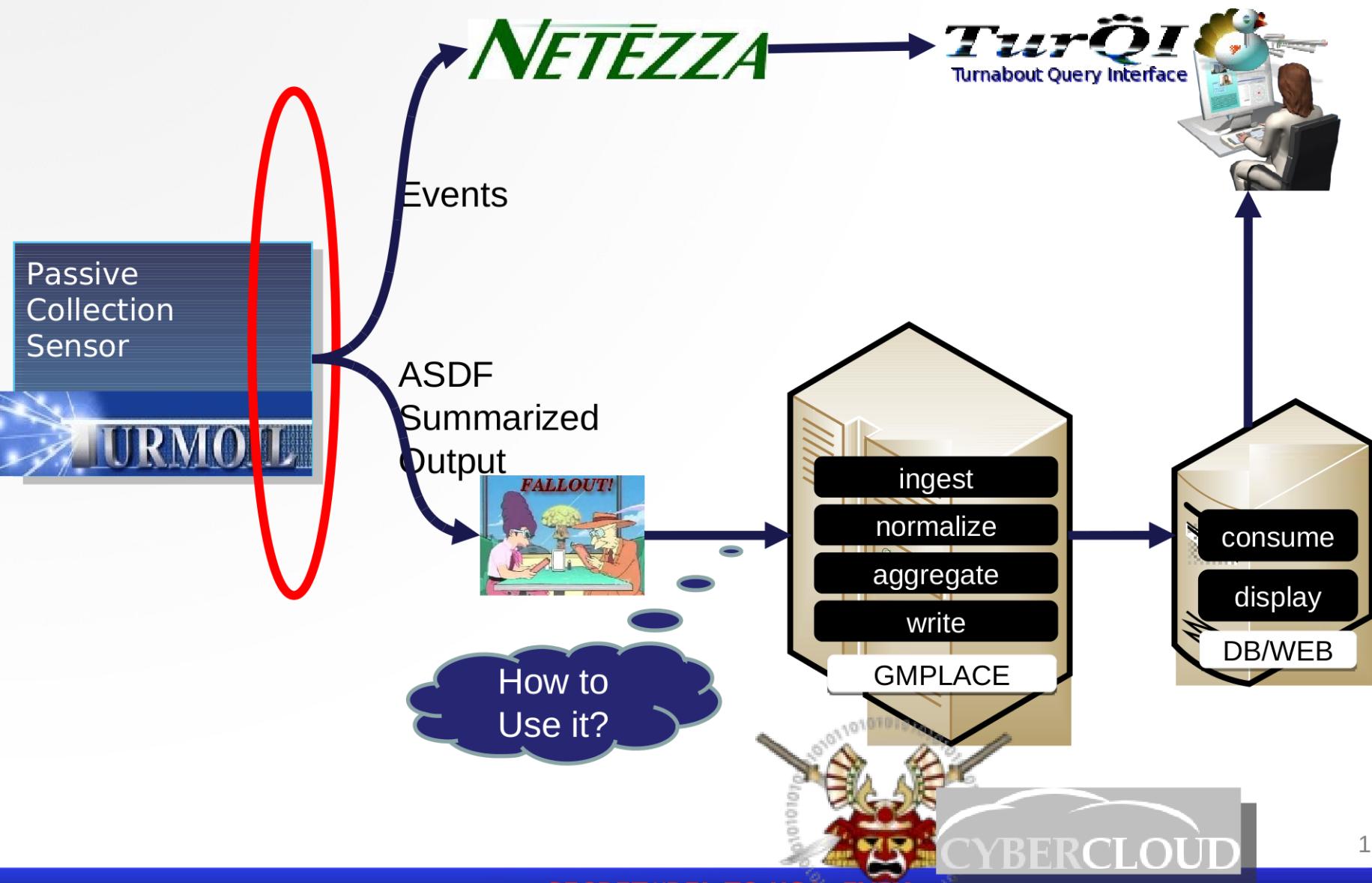
## ⌚ CIDR Block/SID Filter

- Filters Tip Events based on IP information OR SID.

## ⌚ cwbBot

- Translates Tip messages to adhere to TRAFFICTHIEF schemas.

## (S//REL) Current Dataflow



## (TS//SI//REL) Prototype View - POUNDSAND

POUNDSAND Prototype Incubator

**Queries**

- Welcome
- BotNet Family ×

**Botnet Families**

Families *	ADDRESS	COUNTRY	CITY	FAMILY	ROLE
Donbot	[REDACTED]	LT	VILNIUS	Donbot	Control Channel
	[REDACTED]	IQ	ASSULAYMANIYA	Donbot	Control Channel
	[REDACTED]	RU	MOSCOW	Donbot	Control Channel
	[REDACTED]	LY	TRIPOLI	Donbot	Control Channel

**Time Frame**

**Country**

Bots	Targets	Details	Detection	Address				
ADDRESS				COUNTRY		CITY	FAMILY	ROLE
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	LB	BEIRUT	Donbot	Bot
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	LB	BEIRUT	Donbot	Bot
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	TM	ASHGABAT	Donbot	Bot
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	LB	BEIRUT	Donbot	Bot
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	LB	BEIRUT	Donbot	Bot
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	IQ	ASSULAYMANIYA	Donbot	Bot
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	IQ	BAGHDAD	Donbot	Bot
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	NL	AMSTERDAM	Donbot	Bot
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	TM	ASHGABAT	Donbot	Bot

**Submit**

## (TS//SI//REL) HIDDENSALAMANDER Outputs

TurQI		Turnabout Query Interface		10000PW0037B_Botnet		RAWSIGHT USJ-759 MHS		NL (92%) akamaltechnologi... 80		NL (88%) NL (88%)		65345 tcp TURMOIL SBV/116191910000 0f4cab8e-0b8c-11e0-a96e-b7e9c6001418	
Date	SID	Signature		Src IP	Dest IP	CASN							
2010-12-01 17:19:47.623875	80815007	botnet/10000PW0037B_Botnet		RAWSIGHT USJ-759 MHS	NL (92%) akamaltechnologi... 80	NL (88%) NL (88%)	65345 tcp TURMOIL SBV/116191910000 0f4cab8e-0b8c-11e0-a96e-b7e9c6001418						
				RAWSIGHT USJ-759 MHS	SE (92%) akamaltechnologi... 80	NL (88%) NL (88%)	2589 tcp TURMOIL SBV/116191910000 0f4cab8e-0b8c-11e0-a96e-b7e9c600135e						
				RAWSIGHT USJ-759 MHS	EE (85%) akamaltechnologi... 80	NL (88%) NL (88%)	62633 tcp TURMOIL SBV/116191910000 0f4cab8e-0b8c-11e0-a96e-b7e9c6001338						

Date SID Signature

Src IP

Dest IP

CASN



Who?

What else can we tell today?

ROLE of the IPs involved: Is it a Bot Controller? Bot Victim? Target?

Who is the Target of this activity? (for certain botnets)

Who has this Bot Controller been commanding (over time)?

What botnet families are active in this region? How active?

What?

What will we tell tomorrow?

What "Attack" commands are active that we could use to exploit?

What type of botnet activity is seen in this region? For this bot family?

- (e.g. Increased "Infections" in US, or, most BadBot activity is "Reconnaissance")

What actual [server, filename, command, IP, url] did they send/grab/connect to?

POUNDSAND



# (S//REL) Current Model for Metadata Enrichment

Optional Payload Details			
Stage Name	Stage Instance	Optional Attribute	Optional Attribute
Configuration	Display/Adjust Bot Name		
	Redirect Traffic		
	Flush DNS		
	Mode Change		
	Connect to Server	ServerIP	
	Unknown		
Infection/Exploit	Update	ServerIP	Web Address
	Download	ServerIP	Web Address
Reconnaissance	DNS IP/ Host Resolve	A Record (multiple)	
	Display Network Information		
	Display System Information		
	Network Scan Enable		
	Network Scan Disable		
	Harvest		
C&C Communication	Disconnect	ServerIP	
	Connect	ServerIP	
	Log In		
	Log Out		
	Current Bot Status		
	Remove Bot		
	Terminate Bot		
Attack	Execute File		
	DDOS	Type (Syn, Http ..)	Target IP
	Open File	File Name	
	Repeat Execute Command	Command	
	Execute Command	Command	

Need  
your  
input!

# (S//REL) “Categorizing” Existing Signatures

- ⌚ Most popular bot signature analyst repositories:

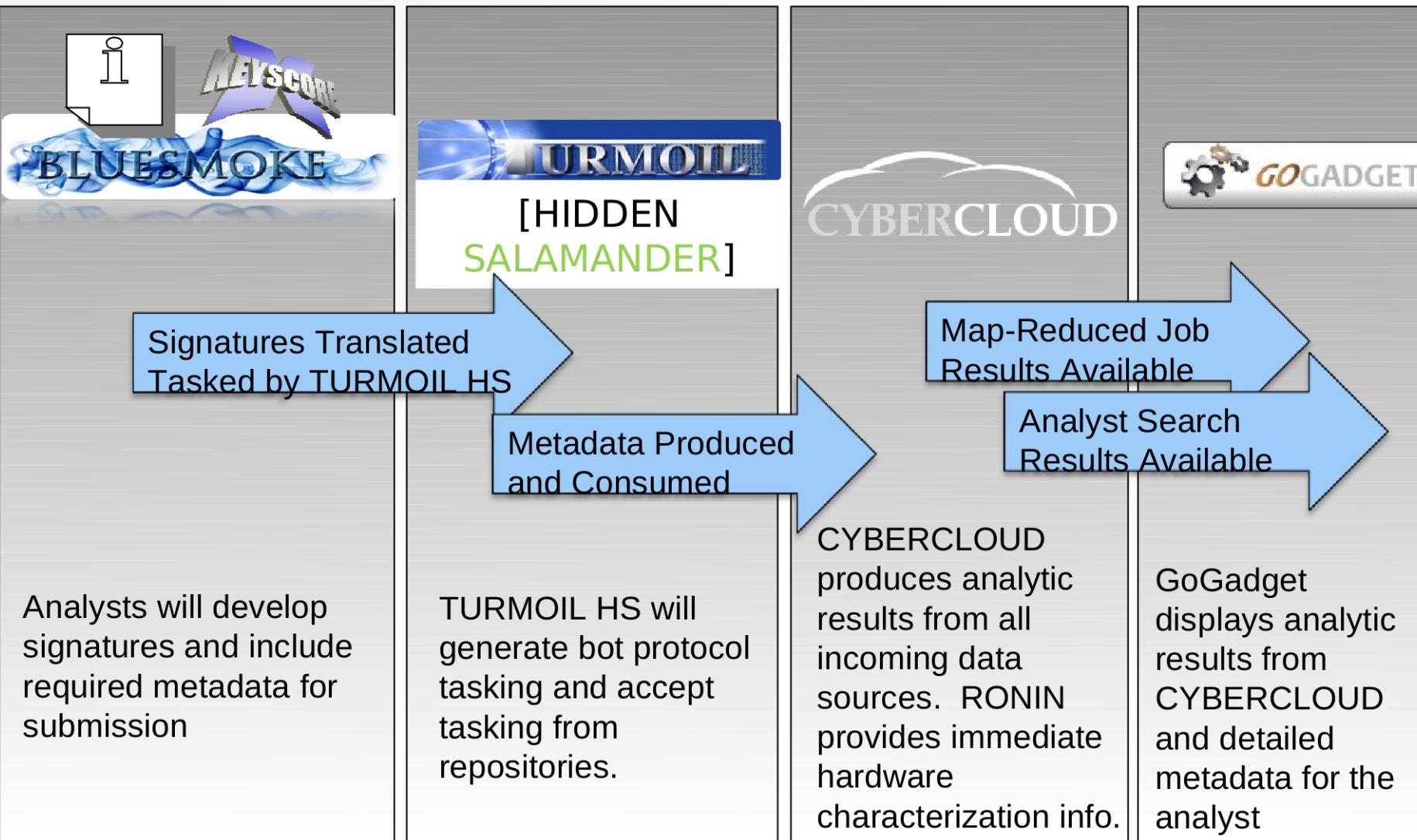
- BLUESMOKE: Snort Rules
- XKEYSCORE: Fingerprints



- ⌚ Requires author to add extra detail to the existing signature
- ⌚ Requires front end tools to add extra fields to their GUIs for analyst input
  - Suggested that the Lifecycle Stage Group and Stage Instance be required for submission for botnet signatures
  - Other attributes may be optional for submission

Need  
your  
input!

# (S//REL) Bot Characterization Proposed Flow



- Questions???

# Example

## ⌚ Command Found:

20;3000;10;0;0;30;300;20;20;2000;3000#flood http [REDACTED] #1#xK3\_2893BC90

## ⌚ How alert describes it:

IP SRC/DEST: 1.1.1.1 / 2.2.2.2

PORT TO/FROM: 234/123

SIGAD/CASN:

SID: 12345

SIGNATURE NAME: BEB:BlackEnergy\_DDoS\_X\_of\_Y

TIME: 00:00:00

for each instance

## ⌚ How summary describes it today:

IP SRC 1.1.1.1 PORT: 123 [ROLE: C2]

IP DEST a.a.a.a PORT: 234 [ROLE: BOT]

b.b.b.b ..

Z.Z.Z.Z ...

SIGAD/CASN: [REDACTED]

SID: 12345

SIGNATURE NAME: BEB:BlackEnergy\_DDoS\_X\_of\_Y

TIME: 00:00:00 – 00:00:10

FAMILY: BEB

Total Events: 51



# Example

## ⌚ Command Found:

20;3000;10;0;0;30;300;20;20;2000;3000#flood http [REDACTED] #1#xK3\_2893BC90

## ⌚ How Summary describes it (tomorrow):

IP SRC 1.1.1.1 PORT: 123 [ROLE: C2]

IP DEST a.a.a.a PORT: 234 [ROLE: BOT]

b.b.b.b ..

z.z.z.z ...

SIGAD/CASN:

SID: 12345

SIGNATURE NAME: BEB:BlackEnergy\_DDoS\_X\_of\_Y

FAMILY: BEB

TIME: 00:00:00 – 00:00:10

Total Events: 51

CONFIGURATION / BOTID: xK3\_2893BC90

ATTACK / DDOS / COMMAND: 20;3000;10;0;0;30;300;20;20;2000;3000#flood http [REDACTED]  
[REDACTED] #1#xK3\_2893BC90

ATTACK / TARGET: [REDACTED]

# Example #2

## ⌚ Command Found:

```
JOIN :#marCh2#<crlf>:TESTING1.Virus.HERE 332 virus-squadlr #marCh2# :!NAZELmarCh2
http://[REDACTED]/page/file.jpeg aFile.exe 1<crlf>
```

## How alert describes it:

We don't want alert! It's insignificant for defensive activity!

## ⌚ How summary describes it today:

IP SRC 1.1.1.1 PORT: 123 [ROLE: C2]  
IP DEST a.a.a.a PORT: 234 [ROLE: BOT]  
b.b.b.b ..  
z.z.z.z ...

SIGAD/CASN:

SID: unknown!!!

SIGNATURE NAME: botnet/quantumbot/possible\_download1 (XKS Fingerprint-derived)

TIME: 00:00:00 – 00:00:10

FAMILY: IRC\_GEN

Total Events: 3

# Example

## ⌚ Command Found:

```
JOIN :#marCh2#<crlf>:TESTING1.Virus.HERE 332 virus-squadlr #marCh2# :!NAZELmarCh2
http://[REDACTED]/page/file.jpeg aFile.exe 1<crlf>
```

## ⌚ How Summary describes it (tomorrow):

IP SRC 1.1.1.1 PORT: 123 [ROLE: C2]  
IP DEST a.a.a.a PORT: 234 [ROLE: BOT]  
b.b.b.b ..  
z.z.z.z ...

SIGAD/CASN:

SID: unknown!!!

SIGNATURE NAME: botnet/quantumbot/possible\_download1 (XKS Fingerprint-derived)

FAMILY: IRC\_GEN

TIME: 00:00:00 – 00:00:10

Total Events: 3

CONFIGURATION / BOTID /NICKNAME: virus-squadlr

C&C COMMS / CONNECT / CHANNEL: #marCh2#

C&C COMMS / CONNECT / SERVER: TESTING1.Virus.HERE

INFECTION / UPDATE / COMMAND: !NAZELmarCh2 [REDACTED] aFile.exe 1

