

SIM3 : Security Incident Management Maturity Model

SIM3 mkXVIII^{c1}
Don Stikvoort, 30 March 2015

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¹ In the “b” version of SIM3 mkXVIII, links to external sources have been updated and some typos removed.

Starting Points

- The topic here is the Maturity of *Security Incident Management* (SIM) rather than just “CSIRT” which by virtue of the name is about “response” primarily. SIM has four major pillars:
 - Prevention
 - Detection
 - Resolution
 - Quality control & feedback
- The primary scope here is IT & information security incidents: incidents that are limited to computers, network appliances, networks and the information therein and conveyed thereon. One can however extend this scope, or narrow it down, often with no significant consequences for the model.
- For reasons of word economy, the term “CSIRT” is used here to describe any SIM capability to which SIM3 is applied, whether team, service or function. “ISIMC” – Information Security Incident Management Capability – is really a better word than “CSIRT” but the latter is widely known and therefore already rings all the right bells. The term “CSIRT” is identical to the older name “CERT”, which is also commonly used. However, those who actually want to adopt “CERT” in their name are advised to seek consent² of the CERT Coordination Center (CERT/CC), as CERT is a trademark owned by Carnegie Mellon University, Pittsburgh, in the USA.
- The copyright holders promote widespread use of this model. The copyright statement is intended to keep the model unified, i.e. avoid various versions being used at the same time – other than that, the copyright holders promote an “open source” not-for-profit³ approach which will help improve this model and its applications. Both maturity and certification gain in meaning when there is an agreed on starting point. TF-CSIRT and their Trusted Introducer (TI) trust model have already adopted the SIM3 model in May 2010. This meant that in 2010 already over 100 European CSIRTs supported the use of SIM3. TF-CSIRT/TI has additionally based a Certification on SIM3, which was launched in September 2010. Since then, 25+ teams have been certified based on this model⁴.
- The author and copyright holders suggest that not only TF-CSIRT but also global fora such as IETF and FIRST – and trans-national fora like APCERT, LACNIC and AfricaCERT – could benefit from adopting this model, and further developing it together.

² See <https://www.sei.cmu.edu/education-outreach/license-sei-materials/authorization-to-use-cert-mark/index.cfm>

³ For-profit use is intended and promoted as well, but those wishing to do so are requested to get in touch with the Open CSIRT Foundation (OCF) to create a synergetic approach. OCF is a not-for-profit foundation. See <https://www.opencsirt.org>

⁴ See https://www.trusted-introducer.org/directory/alpha_certification_Z.html

Basic SIM3

The maturity model is built on three basic elements:

- 1) Maturity Parameters
- 2) Maturity Quadrants
- 3) Maturity Levels

The Parameters are the quantities that are measured in regard maturity – over 40 exist and they are detailed below. Each Parameter belongs to one of four Quadrants - the Quadrants are therefore the main four categories of Parameters:

- O - Organisation
- H - Human
- T - Tools
- P - Processes

These four Quadrants have been chosen in such a way that the parameters in there are as mutually independent as possible.

What we really measure are the Levels for each Parameter. A desirable simplicity of the SIM3 has been reached by specifying a unique set of Levels, valid for all of the Parameters in all of the Quadrants:

- 0 = not available / undefined / unaware
- 1 = implicit (known/considered but not written down, “between the ears”)
- 2 = explicit, internal (written down but not formalised in any way)
- 3 = explicit, formalised on authority of CSIRT head (rubberstamped or published)
- 4 = explicit, audited on authority of governance levels above the CSIRT head
(subject to control process/audit/enforcement)

To make these five Levels even clearer, let’s have a look at what needs to be added to go from one level to the next:

- 0 → 1 : addition of *consideration* - “listen, we are aware of this”
- 1 → 2 : addition of *written description* - “read, this is the way we do it”
- 2 → 3 : addition of *accountability* - “look, this is what we are bound to do”
- 3 → 4 : addition of *control mechanism* – “and this is how we make sure that it happens”

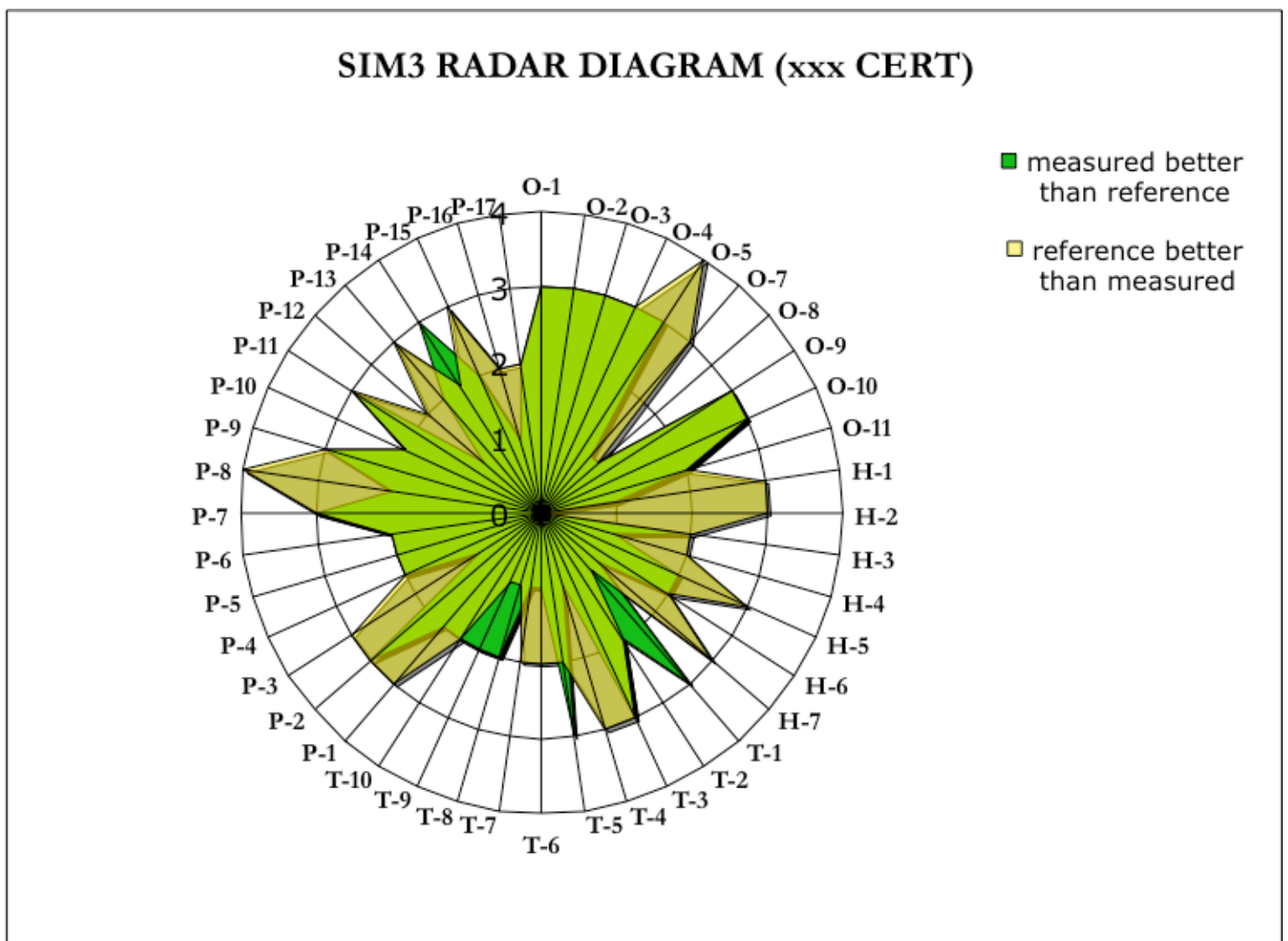
Such simplicity is great in terms of ease of use and presentation – but has its drawbacks too. This is especially noticeable in a few Parameters that, when you apply them in real life, are reluctant to be mapped onto a specific Level. However the advantages of this simplified scheme far outweigh the few quirks encountered.

SIM3 Reporting

The basic and most useful way to report a SIM3 assessment of an actual CSIRT has two elements:

- 1) A list of all the Parameters for the four Quadrants, with their respective assessed Levels – plus comments where due.
- 2) A “radar” diagram of all the Parameters and their assessed Levels.

A real-life example is given below. This is an assessment of the CSIRT of a major commercial organisation, where green represents the actual team and yellow represents the reference, i.e. current best-practice Levels (mapped here to draft TI certification levels of April 2010) – this way dark green means above reference and yellow below reference – the “mixed” area which is light green is compliant with the reference.



3) A high level simplified chart.

A simplified presentation of the above radar diagram can be desirable for management or constituency level presentations. Averaging Levels per Quadrant is acceptable for that purpose, providing the simplification and resulting lack of granularity is properly explained. Averaging over all four Quadrants is not acceptable as it suggests that one number can represent the overall SIM3 level, which is a misleading simplification. An averaging per Quadrant leads to a chart as below, derived from the radar plot above. Again, green is the actual score, dark green (not present here) above reference, yellow below reference, light green the “mixed” area which is compliant with the reference.

SIM3 OVERVIEW CHART (xxx CERT)



SIM3 Parameters

The Maturity Parameters come with the following tags:

```
[Parameter Identifier] : [Parameter Name:]  
Description:  
{ OPTIONAL: Clarification: }  
{ OPTIONAL: Minimum Requirement: }  
{ OPTIONAL: Accreditation Requirement: }  
{ OPTIONAL: Certification Requirement: }
```

This is mostly self-explanatory, with the exception of “minimum requirement” – now this field will be empty in many cases, but sometimes it is not sufficient for a Parameter to be only defined: the definition must also achieve some minimum level to be acceptable to the professional CSIRT community. An example is O-7, which is about "service level description" where the minimum level requires a human response within a certain number of working days. This way, the "minimum requirement" could help avoid empty placeholders, as clearly e.g. a defined and approved policy (Level 3) which states that reactions will be within one month, is useless and immature in the context of CSIRT operations.

The optional field “Accreditation Requirement” is not foreseen to be used by the TI yet in 2010, as SIM3 is proposed to be used as a self-assessment tool in the accreditation phase, and hence not as a fixed standard.

The full list of Parameters is provided below.

O – “Organisation” Parameters

O-1 : MANDATE

Description: The CSIRT’s assignment as derived from upper management.

O-2 : CONSTITUENCY

Description: Who the CSIRT functions are aimed at – the “clients” of the CSIRT.

O-3 : AUTHORITY

Description: What the CSIRT is allowed to do towards their constituency in order to accomplish their role.

O-4 : RESPONSIBILITY

Description: What the CSIRT is expected to do towards their constituency in order to accomplish their role.

O-5 : SERVICE DESCRIPTION

Description: Describes what the CSIRT service is and how to reach it.

Minimum requirement: Contains the CSIRT contact information, service windows, concise description of the CSIRT services offered and the CSIRT’s policy on information handling and disclosure.

O-6 : (intentionally left blank – not included in “scoring”)

O-7 : SERVICE LEVEL DESCRIPTION

Description: Describes the level of service to be expected from the CSIRT.

Minimum requirement: Specifies the speed of reaction to incoming incident reports and reports from constituents and from peer CSIRTs. For the latter a human reaction within two working days is the minimum expected.

O-8 : INCIDENT CLASSIFICATION

Description: The availability and application of an incident classification scheme to recorded incidents. Incident classifications usually contain at least “types” of incidents or incident categories. However they may also include the “severity” of incidents.

O-9 : INTEGRATION IN EXISTING CSIRT SYSTEMS

Description: Describes the CSIRT's level of membership of a well-established CSIRT co-operation, either directly or through an "upstream" CSIRT of which it is a customer/client. This is necessary to participate and integrate in the trans-national/worldwide CSIRT system(s).

O-10 : ORGANISATIONAL FRAMEWORK

Description: Fits O-1 to O-9 together in a coherent framework document serving as the controlling document for the CSIRT.

Minimum requirement: Describes the CSIRT’s mission and parameters O-1 to O-9.

O-11 : SECURITY POLICY

Description: Describes the security framework within which the CSIRT operates. This can be part of a bigger framework, or the CSIRT can have their own security policy.

H – “Human” Parameters

H-1 : CODE OF CONDUCT/PRACTICE/ETHICS

Description: A set of rules or guidelines for the CSIRT members on how to behave professionally, potentially also outside work.

Clarification: E.g. the TI CCoP⁵. Behaviour outside work is relevant, because it can be expected of CSIRT members that they behave responsibly in private as well where computers and security are concerned.

H-2 : PERSONNEL RESILIENCE

Description: How CSIRT staffing is ensured during illness, holidays, people leaving, etc.

Minimum requirement: three (part-time or full-time) CSIRT members.

H-3 : SKILLSET DESCRIPTION

Description: Describes the skills needed on the CSIRT job(s).

H-4 : INTERNAL TRAINING

Description: Internal training (of any kind) available to train new members and to improve the skills of existing ones.

H-5 : EXTERNAL TECHNICAL TRAINING

Description: Program to allow staff to get job-technical training externally – like TRANSITS, ENISA CSIRT Training, or commercial training programs (CERT/CC, SANS, etc.)

H-6 : (EXTERNAL) COMMUNICATION TRAINING

Description: Program to allow staff to get (human) communication/presentation training externally.

H-7 : EXTERNAL NETWORKING

Description: Going out and meeting other CSIRTs. Contributing to the CSIRT system when feasible.

⁵ See <https://www.trusted-introducer.org/TI-CCoP.pdf>

T – “Tools” Parameters

T-1 : IT RESOURCES LIST

Description: Describes the hardware, software, etc. commonly used in the constituency, so that the CSIRT can provide targeted advice.

T-2 : INFORMATION SOURCES LIST

Description: Where does the CSIRT get their vulnerability/threat/scanning information from.

T-3 : CONSOLIDATED E-MAIL SYSTEM

Description: When all CSIRT mail is (at least) kept in one repository open to all CSIRT members, we speak of a consolidated e-mail system.

T-4 : INCIDENT TRACKING SYSTEM

Description: A trouble ticket system or workflow software used by the CSIRT to register incidents and track their workflow.

Clarification: RTIR, AIRT, OTRS, trouble ticket systems in general.

T-5 : RESILIENT PHONE

Description: The phone system available to the CSIRT is resilient when its uptime and time-to-fix service levels meet or exceed the CSIRT’s service requirements.

Clarification: Mobile phones are the easiest fallback mechanism for when a team’s landlines are out of order.

Minimum requirement: Fallback mechanism for the case of phone system outages

T-6 : RESILIENT E-MAIL

Description: The e-mail system available to the CSIRT is resilient when its uptime and time-to-fix service levels meet or exceed the CSIRT’s service requirements.

T-7 : RESILIENT INTERNET ACCESS

Description: The Internet access available to the CSIRT is resilient when its uptime and time-to-fix service levels meet or exceed the CSIRT’s service requirements.

T-8 : INCIDENT PREVENTION TOOLSET

Description: A collection of tools aimed at preventing incidents from happening in the constituency. The CSIRT operates or uses these tools or has access to the results generated by them.

Clarification: e.g. IPS, virus scanning, spam filters, port scanning. If not applicable as for a purely coordinating CSIRT, choose -1 as Level and will be omitted from “scoring”.

T-9 : INCIDENT DETECTION TOOLSET

Description: A collection of tools aimed at detecting incidents when they happen or are near happening. The CSIRT operates or uses these tools or has access to the results generated by them.

Clarification: e.g. IDS, Quarantinenets, netflow analysis.

T-10 : INCIDENT RESOLUTION TOOLSET

Description: A collection of tools aimed at resolving incidents after they have happened. The CSIRT operates or uses these tools or has access to the results generated by them.

Clarification: E.g. basic CSIRT tools including whois, traceroute etc; forensic toolkits.

P – “Processes” Parameters

P-1 : ESCALATION TO GOVERNANCE LEVEL

Description: Process of escalation to upper management for CSIRTs who are a part of the same host organisation as their constituency. For external constituencies: escalation to governance levels of constituents.

P-2 : ESCALATION TO PRESS FUNCTION

Description: Process of escalation to the CSIRT’s host organisation’s press office.

P-3 : ESCALATION TO LEGAL FUNCTION

Description: Process of escalation to the CSIRT’s host organisation’s legal office.

P-4 : INCIDENT PREVENTION PROCESS

Description: Describes how the CSIRT prevents incidents, including the use of the related toolset. Also, this includes the adoption of pro-active services like the issuing of threat/vulnerability/patch advisories.

P-5 : INCIDENT DETECTION PROCESS

Description: Describes how the CSIRT detects incidents, including the use of the related toolset.

P-6 : INCIDENT RESOLUTION PROCESS

Description: Describes how the CSIRT resolves incidents, including the use of the related toolset.

P-7 : SPECIFIC INCIDENT PROCESSES

Description: Describes how the CSIRT handles specific incident categories, like phishing or copyright issues.

Clarification: may be part of P-6.

P-8 : AUDIT/FEEDBACK PROCESS

Description: Describes how the CSIRT assesses their set-up and operations by self-assessment, external or internal assessment and a subsequent feedback mechanism. Those elements considered not up-to-standard by the CSIRT and their management are considered for future improvement.

P-9 : EMERGENCY REACHABILITY PROCESS

Description: Describes how to reach the CSIRT in cases of emergency.

Clarification: Often only open to fellow teams.

P-10 : BEST PRACTICE E-MAIL AND WEB PRESENCE

Description: Describes (1) the way in which generic, security related mailbox aliases @org.tld are handled by the CSIRT or by parties who know when what to report to the CSIRT – and (2) the web presence.

Minimum Requirement:

(1) The handling of the following mailbox aliases (from RFC-2142 and best practice) is secured in such a way that the handlers either are part of the CSIRT **or** know the CSIRT, what it is for, and how to reach it when needed:

Security: security@ ; cert@ ; abuse@

E-mail: postmaster@

IP-numbers & domain names: hostmaster@

WWW: webmaster@ ; www@

(2) Some form of web presence for the CSIRT, at least internally. That presence must at least explain what the CSIRT is for, who it is for, and how it can be reached and when. Additional

recommendations are (a) to link rfc-2350 from that presence, and (b) to enable a slash-security page, that is a page like www.org.tld/security , which can serve a wider security purpose than just the CSIRT.

P-11 : SECURE INFORMATION HANDLING PROCESS

Description: Describes how the CSIRT handles confidential incident reports and/or information. Also has bearing on local legal requirements.

Clarification: it is advised that this process explicitly supports the use of TLP, the information sharing Traffic Light Protocol⁶. (In the next version of this document this advice will most likely become a requirement.)

P-12 : INFORMATION SOURCES PROCESS

Description: Describes how the CSIRT handles the various information sources available to the CSIRT (as defined in the related tool, if available – see T-2).

P-13 : OUTREACH PROCESS

Description: Describes how the CSIRT reaches out to their constituency not in regard incidents but in regard PR and awareness raising.

P-14 : REPORTING PROCESS

Description: Describes how the CSIRT reports to the management and/or the CISO of their host organisation, i.e. internally.

P-15 : STATISTICS PROCESS

Description: Describes what incident statistics, based on their incident classification (see O-8), the CSIRT discloses to their constituency and/or beyond.

Clarification: If not applicable as in case of an explicit choice only to report internally, choose -1 as Level and will be omitted from “scoring”.

P-16 : MEETING PROCESS

Description: Defines the internal meeting process of the CSIRT.

P-17 : PEER-TO-PEER PROCESS

Description: Describes how the CSIRT works together with peer CSIRTs and/or with their “upstream” CSIRT.

⁶ <https://www.first.org/tlp/>