

## Business-IT Transparency with Cfengine Nova

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A Business White Paper

IT management is growing in scope and complexity, but IT methods lag behind. Cfengine Nova offers a knowledge-enhanced framework for configuration management that goes beyond technical configuration to support the needs of businesses. Features include compliance management, reporting and business integration. Cfengine nova supports IT's growing need to handle complexity, without oversimplifying.

Cfengine Nova brings transparency to public and private Cloud, by integrating Knowledge Management from the bottom up, with its policy-based (model-based) framework and integrated Mission Portal.

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## What's wrong with IT Management?

Current approaches to IT management frequently fail to fulfill the business needs of organizations, and consume an excess of time and resources. Organizations feel increasing pressure from:

- The scale and complexity of IT services, with reduced business agility.
- The need to reduce spiralling costs and lower the risk of change.
- A growing technical and cultural divide between IT and business services, leading to poor communication and an inability to deliver business needs on time.

IT management methods have been ill-equipped to deal with the rapid growth and demand for IT services over the past decade, and specialization in business and IT services has fostered sub-cultures that communicate ineffectively about strategic imperatives. Today, it is still common to use brute-force approaches to management, throwing time and money at problems to repair them manually with often inconsistent results.

Such practices mean that today's datacentres suffer a breakdown of agility, certainty, and predictability, frequently mandating 'system lock-downs' for fear of natural system evolution. In short, datacentres doubt their ability to cope with their own environments.

In spite of a number of recent attempts to bring automation to bear on the problem, the brute force approach prevails. What is needed is lightweight methods that bring provable predictability, without a loss of human control.

Cfengine has pioneered technology that restores confidence and predictability in system management since 1993, and today augments this with theory and methodology (cf. 'best-practices') to reduce human management overheads, placing humans back in the driving seat of change. It is our aim to teach properly researched approaches to management that can scale to future needs, without compromising business goals.

## High-risk, low-productivity IT

According to industry statistics, more than 50% of all IT projects fail. IT management has a culture of simply taking on too much – taking on large-scale risky 'roll-outs' instead of practicing small testable increments with low risk. In short, IT management is 'rocket science' when organizations need 'commercial air travel'.

This is a telling analogy. Although the demands for agility and renewal have never been greater, most IT change today is made like a rocket launch: vast multi-year projects, that attempt feats never before rehearsed, costing 90% in overhead to deliver a 10% payload. The launch date is a once-only chance to get the deployment right, requiring the finest minds working overtime, and no one is confident in the outcome because it was a year since they last did anything like it. Finally, if it doesn't work, they have to pick up the pieces and start all over again.

This is not a good model for business, but it is the way that datacentre deployments are made today.

To support business goals, an IT department needs to 'be' a 747 commercial airliner: a reusable craft that can be mass produced by ordinary craftsmen; it can be reconfigured on-the-fly to carry a variety of cargoes to any destination, is standardized in a recognizable form



and function, and the whole project can be turned around in an hour to go again, and with a low risk and high safety record. This is a suitable business model.



Image reproduced courtesy of [www.flyforfun.be](http://www.flyforfun.be)

Pilots and passengers rehearse this procedure continuously, so the fear of failure is low. Instead of years of training to become an astronaut, untrained users can simply scan a boarding ticket to make a flight.

## Escaping from the trap

System engineers are rocket scientists today because they are forced to squander creative expertise on the simplest of tasks, reinventing wheels for each minor adaptation of the system. With systems held together by a few irreplaceable specialists, and usually overrun with support incidents, businesses are locked into a risky poverty trap of *no time to change*.

Cfengine brings two aspects to solving this conundrum:

- *Proper division of labour (automation)*

Most organizations lack effective automation. IT experts are good at reasoning and decision-making, but are poor when it comes to effecting consistency in repair. Automation brings cheap, scalable and consistent implementation that exceeds human capabilities by providing continuous maintenance to repair deviations from

planned compliance. Cfengine pioneered policy or model-based configuration, with its carefully researched innovation.

- *Proper management of expertise (knowledge)*

Datacentres are often run by wizard-like experts who are not motivated to document their efforts or pass on their understanding to others. They become the weakest link in a business by being the most needed resource. They become the 'single points of failure' instead of trusted partners in a creative development.

At Cfengine, we believe that all minds are sharpened by working on worthy goals, through a proper division of labour, and that the pain can be taken out of documentation and knowledge transfer by attending to the interests and habits of the datacentre's expert minds with appropriate tools.

When designing its entry level product Nova, Cfengine has made *knowledge* the focus at all levels, because knowledge is what turns around the poverty of a downward spiral into an upward climb. Knowledge is at the heart of planning, achieving and assessing results. It is what fills experts with pride and what opens the door for others to meet them in creative dialogue.

## Not just a patching system - Model Based Configuration

Many automation products are just patch systems. When a fault occurs, the system is often taken out of service, patched with a generic 'packaged' fix and returned to service. The problem with this approach is that it makes specialization of machines difficult and costly, as different patches have to be packaged and then deployed to the right hosts from a central repository. That is expensive and awkward to manage.

Cfengine works differently. It is programmed to repair faults according to a *model*. Every host knows its own intended state and has the tools to repair with a minimum of intervention, so that machines do not need to be taken out of service. There is no need to patch systems generically unless third-party software updates become available – then the model makes finding the right patch for the right machine a trivial procedure, and will automatically converge any customization using the model afterwards.

## What the future looks like

In the early 1990s the IT world was full of needless complexity: a multitude of different operating systems powered data centers, but many environments were still small enough to be managed by hand. Technologies like Cfengine were able to hide (or *virtualize*) the underlying differences between operating systems and bring consistency of implementation. Organizations who adopted automation early have prospered.

Today, operating systems are more uniform, and datacentres are dominated mainly by a few key systems, but the sheer numbers of machines exclude the possibility of manual change and repair. Automation is a requirement, just like power-assisted steering or anti-lock brakes. Companies like Google and Facebook cite automation as the key enabler for their rapid growth. These companies typically use fewer IT staff to maintain many thousands of machines than smaller companies use to maintain hundreds.



Soon a new level of simplified and virtualized infrastructure (e.g. the descendents of 'Cloud Computing') will simplify more of the challenges IT departments face, making IT resources more reusable. However, the need to implement *planned intentions* and *promised configuration* will not go away. Moreover, *certainty* and *predictability* will be in even greater demand.

## Cfengine leading the way

Cfengine has been a thought leader in IT management since 1993. Today, Cfengine Nova plays two key roles in bringing *certainty* and *predictability* to datacentre operations, avoiding the brute force approaches of the past.

- Model-based (policy-based) automation turns engineering into Knowledge Management. When repetitive implementation has been automated, all that is left to work on is improving one's understanding and exploring new strategies for improvement (knowledge). By using models for *desired state* or *policy*, even complex IT environments can achieve *compliance* and *reliability* both during and in-between change.
- By capturing the actual state of systems cheaply and intelligently, and comparing it to policy intentions, Cfengine brings its own independent confirmation that the intended policy is working as promised. A decentralized architecture enables scalability of change, while attention to knowledge allows scaling of human *comprehension*.

In Cfengine, every decision you make about a system may be thought of as a promise, that Cfengine will help the system keep. Accurate knowledge about these promises and their outcomes is what brings confidence in IT management.

Cfengine Nova goes beyond the implementation of mere tools for expert engineers. It integrates knowledge into the IT management process from decision to outcome. Nova automates the generation of documentation from policy itself, creating a simple narrative about the system that can be used to inform inexperienced or temporary staff about the intended state, and it demonstrates compliance with the intended model for use in independent audits. Cfengine goes beyond the traditional Configuration Management Database (CMDB) to offer real insight for the next generation datacentre architecture.

## Nova attends to business goals

Trust and confidence are just one of the pillars of business; agility and creativity make up the others. Cfengine Nova has features that make it possible to connect the dots meaningfully between high level business goals and low level configuration implementation.

- Cfengine Nova's rich repertoire of configuration capabilities allows model-based integration of systems, attending to the unique requirements of each business service. Off-the-shelf does not have to mean bland and generic. Customization is Cfengine's forte. It is the glue holding applications together.
- Nova's speed and use of patterns allows many small changes to be made very quickly.

Nova provides appropriate insight into IT operations through explanation, reporting and visualization of policy, allowing business and IT to gather around information of mutual interest. Of course, Cfengine is not going to make IT experts of business staff, or vice versa. However, business and IT work best together when they can communicate effectively. Our aim with Nova is to give business heads just the right level of insight into technical IT operations to be





assured that their needs are being met<sup>1</sup>. Similarly, Nova makes business goals available to IT staff so that they can feel connected and responsible for the strategic goals of the organization.

CFENGINE MISSION PORTAL **service catalogue**

SUMMARY PLANNING STATUS KNOWLEDGE Planning : services

Services and methods

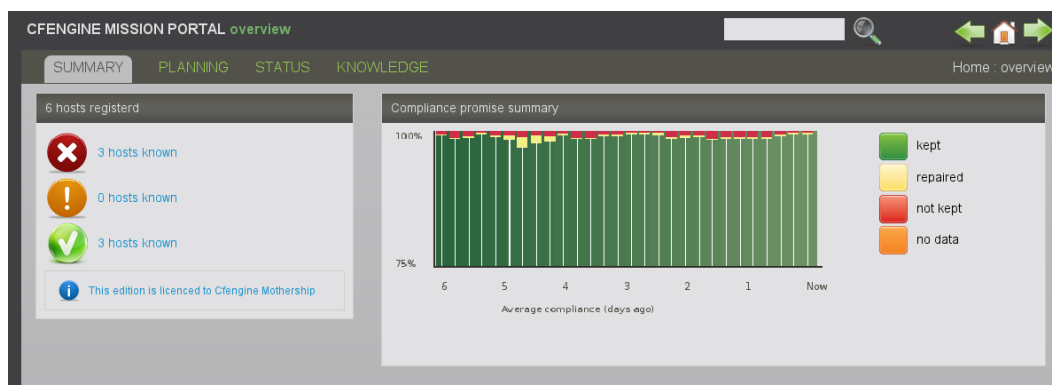
Type	Service bundle name	Contributing to goals	
agent	app_svn_hooks	Does not promise to align with any goals	
agent	app_svn_headers	Does not promise to align with any goals	
agent	app_versioning_svn	goal_3 As a matter of law, the company must be compliant with Sarbanes Oxley act. goal_1 The company mission depends on the reliable provision of services to our customers goal_2 The company should be running the proven but recent versions of key software	
agent	app_mail_mailman	goal_3 As a matter of law, the company must be compliant with Sarbanes Oxley act.	
agent	app_mail_imap	goal_3 As a matter of law, the company must be compliant with Sarbanes Oxley act.	
agent	app_mail_postfix	goal_3 As a matter of law, the company must be compliant with Sarbanes Oxley act. goal_1 The company mission depends on the reliable provision of services to our customers goal_2 The company should be running the proven but recent versions of key software	
agent	app_db_forum	goal_3 As a matter of law, the company must be compliant with Sarbanes Oxley act.	
agent	app_db_mysql	goal_3 As a matter of law, the company must be compliant with Sarbanes Oxley act.	
agent	app_web_apache	goal_3 As a matter of law, the company must be compliant with Sarbanes Oxley act. goal_1 The company mission depends on the reliable provision of services to our customers goal_2 The company should be running the proven but recent versions of key software	
agent	time_management	Does not promise to align with any goals	
agent	garbage_collection	Does not promise to align with any goals	
agent	service_catalogue	Does not promise to align with any goals	
agent	name_resolution	Does not promise to align with any goals	
agent	anomalies	Does not promise to align with any goals	

mark@cfengine.com has 2 new messages

A human-readable Service Catalogue generated from technical specifications shows what goals are being attended to automatically

## Simple insight into IT compliance

While business and IT can come together to decide what promises IT services should keep, a simple confirmation of that compliance helps business units to be assured



An overview of compliance

<sup>1</sup> Often it is enough to be able to ask a relevant question and feel that one has a voice, while experts are taking care of the details.

Increasing, graded levels of detail can be obtained to match the level of expertise of the viewer. Bar meters can represent more specific details.



Weakest hosts broken down by compliance, performance and change.

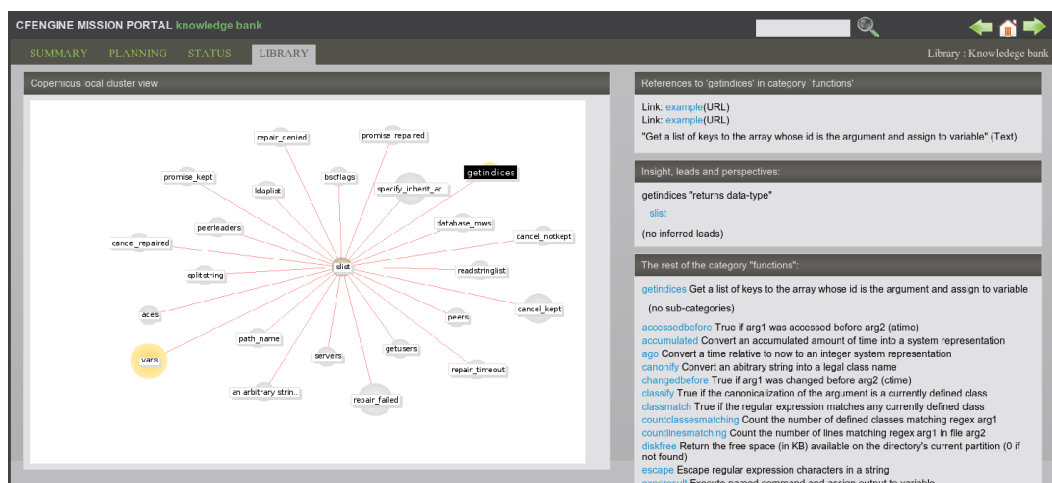
For system analysts, Nova can recognize and highlight trends and patterns of behaviour that inform further strategic decision making.



Analysis of system performance over multiple time-scales can aid with resource deployment and future planning.

## Promises, intentions and associations

A unique feature of Cfengine Nova is the ability to analyze and document relationships between facts about policy, system or business, and represent these as a Topic Map (a semantic map).



A semantic web of system relationships can reveal new insights about system resources and intentions.

Our vision of IT management is to provide tools that not merely inform but also teach users new aspects of the systems they manage. Working with Cfengine Nova should be a learning experience, not merely a profusion of confusing data. Cfengine ties together policy intentions with actual promises made, to the software documentation, to explanations of concepts and techniques with examples, and all this linked to current system state. It is by seeing connections that we learn.

## Knowledge Partnership

At Cfengine, we believe that Knowledge Management is the challenge of our times. As futurist Alvin Toffler wrote in his seminal 1970 study about the rapidity and complexity of industrial changes of the '60s:

*"Rising novelty renders irrelevant the traditional goals of our chief institutions...Acceleration produces a faster turnover of goals. Diversity or fragmentation leads to a relentless multiplication... Caught in this churning, goal-cluttered environment, we stagger...from crisis to crisis, pursuing a welter of conflicting and self-cancelling purposes." (Future Shock)*

The same trends are being repeated today in the IT industry.

At Cfengine, we see it as a key strategy to provide simple tools that not only use clear intentions to guide systems, but to help to interpret the meaning of what actually happens. Integrated Knowledge Management leads to better IT decisions and elevates both business and IT services to the status of trusted partners.

## What's new in Nova 2.0?

Cfengine Nova 2.0 is a major upgrade of Cfengine's commercial software, including the latest community core and many improvements to the language interface. In addition, some of the major features in Nova 2.0 include:

- Fast, lightweight report collection to a hub.
- A browsable Web interface allows you to see policy and state side by side.
- CMDB/SKMS capabilities in the Web interface.
- Embedded compliance reporting engine.
- Searchable reporting and analytics.
- A local customizable version of the Copernicus Knowledge Map is now fully integrated-providing searchable online documentation, integrated with the policy browser.
- Virtualization (LibVirt model) support for managing virtual machines.
- Unique-ID support for mobile and dynamic IP support.
- FIPS validated encryption mode.

In addition to these features, Nova 2.0 is built around our extensive bug-reporting and self-diagnostic test suite that has allowed us to improve the reliability and functionality of the software for the most demanding environments.