OASIS | LOSS MODELLING FRAMEWORK

OASIS LOSS MODELLING FRAMEWORK

EXECUTIVE BULLETIN

2021 H1 UPDATE

OBJECTIVES
PART ONE

MARKET OBJECTIVES

- To further develop, promote and curate **Open Exposure, Model and Data Standards.**

- To produce and maintain robust and performant 'Core' **software** platform- "Oasis Core", with extensibility to 'Oasis Enterprise'.

- To make Oasis an **open-source** software standard.

- To review Oasis's **governance** structure.

All: to Increase choice, improve efficiency and stimulate innovation.

OASIS DELIVERED

STANDARDS

It is over a year since Oasis took on the management and development of the new Open Data Standards (ODS), which is an open and transparent standard developed by the market. Since then, many firms have confirmed their support and use of the new standards. (See 'Community' section on page 4)

Oasis has also begun developing a new liability open standard that has all model developers in this space to include AIR, RMS, and Praedicat.

In addition, we have been working with the recently launched Catastrophe Resilience Council (CRC, formerly Helix Initiative) in the USA which are are helping to drive improvements in standards and to further develop and promote open exposure, models and data standards.

Features of the Open Data Standards (ODS)

ZURICH

- General flexibility
- Synergies, as e.g., access to models deployed through Oasis
- Extensibility (e.g., emerging risks)
- Maintaining original exposure data
- Extended user-definition (flexi-tables)
- Support for complex policies
- Does not require SQL Server, but it can be implemented there
- Technical documentation

ODS
Open Data Standards

5   © Zurich

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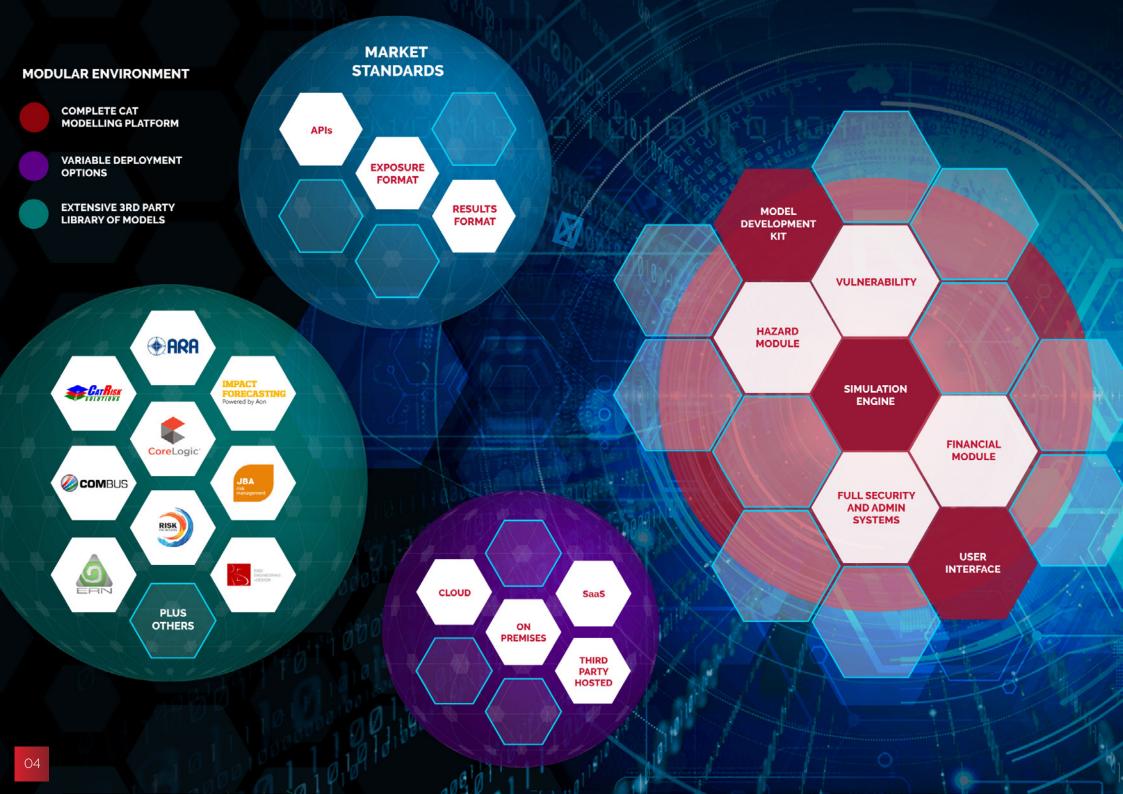
OASIS DELIVERED

SOFTWARE

In the first half of 2021, the Oasis development team delivered two significant improvements to the software as part of a project sponsored by the Insurance Development Forum (IDF). The first of these was a complete redesign of the financial module (FM), which was found to be the main performance bottleneck in the execution of an Oasis analysis, taking more than 95 % of the total computation time in some cases. These changes resulted in very good performance improvements with an increase of up to 400 times for the FM itself leading to overall improvements in performance of between 10 and 75 times. These changes resulted in very good performance improvements with an increase of up to 400 times for the FM itself leading to overall improvements in performance of between 10 and 75 times.

Oasis now embarks on a new project around Oasis at Scale with two key enhancements:

1   **Full distributable Oasis version creating probably the fastest catastrophe platform available globally with multiple servers utilised. This could give runtimes in seconds.**

2   **Feature enhancements that will deliver industry leading functionality (full details in appendix).**

GOVERNANCE

All governance processes from the Oasis board structure and project structure to technical steering groups have been reviewed and adjusted to ensure suitability for all key stakeholders. Oasis has refreshed its Board and is confident post review that its governance processes are robust.

MODULAR ENVIRONMENT

- 🔴 **COMPLETE CAT MODELLING PLATFORM**
- 🟣 **VARIABLE DEPLOYMENT OPTIONS**
- 🟢 **EXTENSIVE 3RD PARTY LIBRARY OF MODELS**

MARKET STANDARDS

- APIs
- EXPOSURE FORMAT
- RESULTS FORMAT

ARA

CatRisk SOLUTIONS

IMPACT FORECASTING
Powered by Aon

CoreLogic

COMBUS

JBA risk management

RISK FRONTIERS

ERN

RISK ENGINEERING +DESIGN

PLUS OTHERS

- CLOUD
- ON PREMISES
- SaaS
- THIRD PARTY HOSTED

- MODEL DEVELOPMENT KIT
- VULNERABILITY
- HAZARD MODULE
- SIMULATION ENGINE
- FINANCIAL MODULE
- FULL SECURITY AND ADMIN SYSTEMS
- USER INTERFACE

OBJECTIVES
PART TWO

YOUR OBJECTIVES

- To maintain a broad and vibrant community of providers and users of the Oasis software, models, data, and tools.

- To increase the choice and quality of models available and enable greater access to a broader set of model and content providers.

- To encourage innovation in catastrophe loss modelling.

All: to Increase choice, improve efficiency and stimulate innovation.

OASIS DELIVERED

COMMUNITY

In March 2021 we announced significant further investment and support from ten leading re/insurance companies that will increase the choice, efficiency and quality of risk models available, and enable open source risk modelling to be adopted as standard across public and private sectors. More information about the Oasis community can be found here. **https://oasislmf.org/community/community-members.**

WORKING WITH OTHERS

We are actively discussing with PERILS AG and B3I on their use of Open standards. We are also working in the US with American association of insurance services (AAIS), as well as NAIC, and CRC to increase the choice and quality of models available.

INNOVATION

UK Centre for Greening Finance and Investment (CGFI). Oasis is part of a newly formed, multidisciplinary organisation, delivering high-impact research, tools, analytics, and information relevant to a range of financial institutions needs to achieve the vision of a greener economy. The UK CGFI will be funded by UK Research and Innovation (UKRI) and led by the University of Oxford (see 'What's Next' on page 10).

OASIS LOSS MODELLING FRAMEWORK

INDICATIVE PRICING PER ANNUM, EXCLUDING APPLICABLE TAXES, HOSTING COSTS.
3-YEAR DEAL

Major territory model in Oasis

Small Company	US$ 479,000
Medium Company	US$ 663,000
Large Company	US$ 930,000

Price per annum, ex applicable taxes, ex hosting costs, 3 year deal.

CHOICE

OVER 100 MODELS FROM 21 DIFFERENT PROVIDERS
*JBA, CoreLogic and GEM's models are covering the globe.

TRANSPARENCY

Oasis continues to curate ODS and chair the steering committee that consists of members.

Oasis is also working with the World Bank to implement its Risk Data Library into ODS. This will introduce standardised vulnerability, hazard and modelling data schemas aimed at developing economies, which will highlight how ODS is not limited to the re/insurance sector.

Oasis and its model providers are leading on the creation of greater transparency in models.

COMMUNITY

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A SNAPSHOT OF OASIS IN THE NEWS

THE INSURER — Global risk capital intelligence

Oasis secures $2mn funding as industry support for cat modelling alternatives grows

23 March 2021

intelligent insurer

International re/insurers invest $2m in Oasis Loss Modelling Framework

insurance Edge — transformation | strategy | innovation

Insurers & Brokers Back Oasis Open Source Platform

23 March 2021 — alastair walker — Insurance & Reinsurance — 0

ARTEMIS — www.artemis.bm

Oasis gets industry backing for Loss Modelling Framework & open source standards

23RD MARCH 2021 - AUTHOR: STEVE EVANS

insurance insider

Open-source modelling platform Oasis receives $2mn in funding

Anna Sagar   23 March 2021

A SNAPSHOT OF RISK MODELLING IN THE NEWS

THE INSURER
Global risk capital intelligence

The importance of choice

23 March 2021

One of the key challenges facing the industry as it seeks to expand coverage for uninsured risks which sit within the current 'protection gap' is the lack of sufficient modelling tools to manage these exposures.

Nasdaq 7th April, 2021

RISK & COMPLIANCE

Leveraging Catastrophe Risk Models to Assess Climate Risk

Insurance BUSINESS U K 27th April, 2021

What's the key to dealing with flood risk?

NEXT STEPS YOU CAN TAKE

CLIMATE CHANGE

Oasis is a founding partner of the new UK funded climate change centre: The UK Centre for Greening Finance and Investment (CGFI). The ultimate vision of CGFI is for financial institutions being able to access and use consistent, timely, and appropriate climate and environmental data and analytics for any point on planet earth historically, in the present, and projected into the future, for every major sector, and for the complete spectrum of material climate and environmental factors. This will produce a new European wind model available in Oasis for Windstorm and Flood.

1 Review exposure management and catastrophe model strategy to allow for new developments including Oasis. Please ask if you would want assistance with a review of existing positions.

2 Start using Open Data Standards (ODS) as part of everyday data collection and market transactions. Detailed information can be found here. **https://oasislmf.org/open-data-standards**

3 Start using Oasis models to fill gaps or supplement existing model coverage to enable a better understanding of your risk.

4 Join in with using models that Oasis has available for climate change (https://www.youtube.com/watch?v=ENtVjPbvzeA) that includes the Danube catchment area, the Philippines and US Hurricane (shortly available). **Let's keep the momentum strong - contact us to get involved in the next steps: info@oasislmf.org.**

SaaS PROVIDERS USING OASIS

Nasdaq

QOMPLX:

KCEEDANCE

IMPACT FORECASTING
Powered by Aon

amazon web services

Azure

APPENDIX

A SNAPSHOT OF THE VIEW FROM THE OASIS COMMUNITY

Allianz

"Oasis fills an important gap in the cat risk management community. It makes the software and with that the 'language' we use in cat risk management available to the open source community. This has the effect that talented cat model developers of any kind – be it long-established ones but also those just getting started – receive access to insurance and reinsurance market participants in a streamlined fashion.

This is a win-win situation: model developers can focus on what they are good at: insight into catastrophe events world-wide. At the same time, they are relieved from the burden to develop and maintain a software that fits the needs of insurance and reinsurance and broker companies and the latter get access to a wide(r) range of models. This makes it financially viable for model developers to also focus on geographical areas or perils that would normally not be in scope for them.

Allianz is a strong supporter of Oasis and believes in the success of standardization where this makes sense: data, cat frameworks and financial modelling. This will lead to a healthy mix of views to risk and with that to a sound cat risk management framework. Allianz has invested over the past years heavily in own tools and frameworks to make cat risk modelling independent of vendors highly automated and integrated in core insurance systems. A strong Oasis backbone will make this step even stronger, this is why we support this initiative."

Dr Sibylle Steimen, MD Advisory & Services, Allianz SE

Aon

"Open catastrophe modelling ecosystems are critical as Aon continues to work with clients to develop a bespoke view of catastrophe risk. This enables insurers to gain greater confidence in their understanding of data assumptions and loss drivers while enhancing their ability to manage their unique portfolios and effectively transfer risk. By backing Oasis in collaboration with Impact Forecasting's catastrophe models, we are excited to bring more choice to insurers – coupled with transparency and customisation – to help them better quantify natural catastrophe risk in an efficient way."

Helen Attenborough, Executive Managing Director for Analytics Software & Product Development at Reinsurance Solutions, Aon

A SNAPSHOT OF THE VIEW FROM THE OASIS COMMUNITY

Chubb

"It's critical that the models we use to manage our catastrophe exposures are both technically sound and reflect Chubb's unique view of risk. The Oasis platform allows us to deploy models that we know inside and out – in some cases we've helped build them – so Oasis creates opportunities to shift to "glass box" models, providing a better understanding of the model components that we use to assess risk. The insight enabled by this transparency is important as it helps form the basis for new products and services to drive improved resiliency from natural catastrophes."

Sean Ringsted, Executive Vice President, Chubb Group Chief Digital Officer and Chief Risk Officer

AXA

"Promoting open and global modelling solutions is part of AXA's ambition to address protection gaps and increase populations resilience over the world. AXA has been an early supporter of the Oasis platform, which we have used to develop internal modeling capabilities. By reinforcing our support to this project, we hope to further contribute to the development of open-source risk models, particularly for poorly documented risks and in emerging markets where modeling resources are scarce. The transparency and scalability of Oasis models are key assets in improving our industry's Cat modeling capabilities, for the benefit of all."

Renaud Guidée, AXA Group Chief Risk Officer

Guy Carpenter

"Oasis plays a role in working with our industry to bring a credible alternative open source computational engine together with structured model specification and data standards. We look forward to the next phase in the evolution of the Oasis platform to ensure the insurance industry has access to a reliable and high performant modelling ecosystem that supports greater choice."

Rob Bentley, Head of Global Strategic Advisory, Guy Carpenter

A SNAPSHOT OF THE VIEW FROM THE OASIS COMMUNITY

Hannover Re

The Oasis open modelling ecosystem - easy to assess not only by the re/insurance industry but also by governments and private markets - has the potential to connect all stakeholders, to increase modelling efficiency and decrease time-to-market for cat protection. It can foster a consistent view of risk and thus improve decision-making on risk mitigation and risk transfer options. Hannover Re supports the initiative as an important contribution to tackle the challenges of climate change and the protection gap, especially in emerging markets.

Dr. Andreas Märkert, Chief Risk Officer and Managing Director Group Risk Management, Hannover Re

Insurance Development Forum

"Risk insight is the foundation on which risk prevention and resilience programmes are built. The IDF is committed to finding ways to improve the availability and quality of risk information and supports efforts to strengthen national risk management systems given the dire implications for vulnerable communities. Building efficiency and reducing cost and duplication in the risk modelling and data ecosystem, through continuous development of open-source platforms, an industry wide interoperability programme and development of common open standards is a central point of achieving this objective. We welcome the commitment of our members to this agenda and the work of Oasis."

Ekhosuehi Iyahen, Secretary General of the Insurance Development Forum

Lloyd's of London

Lloyd's has consistently supported the need for openness and standardisation in exposure management and is very pleased to see the momentum behind Oasis. Lloyd's is driving change to produce a first class digital marketplace and Oasis' ability to drive common standards and enable choice will help to achieve this.

Dr Kirsten Mitchell-Wallace, Head of Portfolio Risk Management Markets, Lloyd's

A SNAPSHOT OF THE VIEW FROM THE OASIS COMMUNITY

RenaissanceRe

"The further development of an open modelling ecosystem, based around Oasis, is important to both the private and public sectors. For the insurance industry it can promote greater choice of available models, transparency and innovation as well as open data standards enabling supply chain efficiencies. For the public sector it will help to close the knowledge gap on a global and local level and provides much needed analytical capabilities and support networks for developing risk insights in support of vulnerable and emerging economies."

Ian Branagan, Senior Vice President and Group Chief Risk Officer

Swiss Re

"Oasis is an open source platform that we fully support as an addition to our proprietary tools. With its principles for standardisation, modularity and transparency, the Oasis platform is a catalyst for improving collaboration in the Cat modelling universe. This translates into expanded access to a greater diversity of risk views and risk models, enabling the ability to leverage the right model for the right purpose. Swiss Re has been supporting Oasis for many years and is now investing even more to push Oasis to the next level. In parallel, we have built flexible access routes for Oasis models that complement Swiss Re's longstanding proprietary NatCat modelling framework."

Thierry Léger, CUO, Swiss Re

SCOR

Oasis forms an important component of SCOR's multi-model platform strategy, and we fully support this latest development of leading-edge cat modelling technology which should accelerate the industry's use of open source CAT models.

Jean-Paul Conoscente, CEO, SCOR P&C

OASIS AT SCALE PROJECT

BACKGROUND

Oasis has already established a solid base and wide reputation, and its production use has started to emerge through a small number of commercial hosting providers and companies' own deployments. It has achieved significant name recognition in the development and humanitarian sector, but now needs to achieve widespread adoption. To reach Oasis' ultimate goal as the main and preferred open platform for independent models that are accessible by both public and private sectors, we need to advance its development over the next 2-3 years. This includes building a vibrant community of diverse users, model developers, data providers, software solution suppliers, hosting and runtime providers, and consultants. The vision is for an ambitious series of enhancements across the modelling ecosystem with Oasis at its centre through the delivery of analytical risk capabilities to meet the evolving needs of the user community, this is collectively referred to as the 'Oasis at Scale' programme. There is an ambition from the community to further develop Oasis to a level, where it becomes deployable at scale using appropriate, modern technologies and techniques to run at scale in a performant and reliable fashion. There needs to be a focus on these developments over a period of time by a dedicated team (or teams) to ensure that the required improvements are delivered.

Up until now, take up of Oasis by the user community has also been hindered by a number of barriers which make the use of new models on a new platform difficult. The Oasis team will need to understand, address and break down all of these barriers in order to ensure success.

THE PROBLEM

Up until today the Oasis team has responded to the needs of a diverse set of users and model developers. This has necessitated the support of various deployment options, model needs and use cases. For a core team of 3 developers this has been too challenging to maintain at a level that any of us would think is ideal. Support from the user community has also been variable so that more areas such as testing and problem identification has been difficult.

PROPOSAL

The 2-3-year 'Oasis at Scale' program plans to deliver a series of ambitious technical and functional enhancements across the modelling eco-system with an enhanced Oasis at its core. To meet the analytical risk functional needs of both the public and private sectors, the Oasis solution will be an out-of-the-box and fully functioning reference enterprise software platform which is scalable, robust, reliable and and one that is API enabled for integration

OASIS AT SCALE PROJECT

with users' own workflows and tools and those of third-party platform providers. Importantly though, the reference software will not provide the entire suite of tools an (Industry) organisation might need to manage the exposure management function in its entirety (complex portfolio reporting for example) but would need to be augmented with additional internally created tools or accessed through a third-party platform provider or tools. The solution itself will be easily deployable - at relatively low cost - with variable installation options, be it on a public cloud, on-premise, or through third-party service providers. Having only one reference architecture and one set of models to test against will be a significant change from previous practice and will help to improve the accountability and reliability of the software. This will have implications for migration to another reference architecture, though these implications will be considered and minimised throughout the programme.

PLAN

Introduction

Oasis technology currently has three levels, and each level is dependent on the previous i.e. a <- b <- c:

1. Model standards and data interfaces (largely documents and schemas)
2. Core Oasis modelling components (Python package)
3. Platform (Distribution framework, user interface, model library, API, Docker containers ++

A: Standards

- Model, exposure, results and data interfaces (documents and schemas) Includes documents and schemas for a range of core standards including:
- Exposure and results standards
- Standards for representation of hazards, vulnerability and financial model
- API's

B: Core Oasis software

- Focusses team and skills on domain specific areas – very hard to replicate and should be a fundamental part of the core platform going forward
- Maximum value of community engagement and expertise e.g. design of FM
- Requires more investment of time + effort from operators and platform users to integrate Oasis models, but this isn't trivial now and opens up many more options.

C: Full platform

- Development skills are more commoditized, though expensive
- Minimal useful input from community
- Requires community to agree on one or two reference stacks
- Still requires more investment from operators and platform users to integrate Oasis into workflow, in particular if they use a different stack

A&B are important to have within cat modelling specific experts with domain knowledge because:

- It would be difficult/expensive to bring an external dev team fully up to speed with cat modelling concepts and terminology
- Getting the appropriate blended team – specialist devs + modelling experts + market experts – would probably be impossible through a consultancy
- Stable set of technologies – data + Python – so permanent hires make sense
- Requirement to foster close working relationships with the Oasis community.
- Alignment of ethos of small(ish) team, open source development and analytics.

Conversely for C other options might make sense because:

- Minimal specialist knowledge required, but expertise in enterprise systems is
- Aligns well with the sort of projects that software consultancies are good at solving i.e. APIs, cloud integration, security ++
- Could provide commercial options for deployment and support, or related data management projects.

Unclear exactly what the best tech stack is, and this might evolve, so can pick and choose partners appropriately e.g. AWS vs Azure specialists

OASIS SOFTWARE LAYERS

Interfaces
- Oasis UI
- Third party User interface
- Third party API Or services

Platform
- Django REST API
- Results / exposure data Storage
- Execution Queues
- Cloud Services

Core Software
- Command Line Interface
- Exposure Processing
- Risk / Area Lookups
- MDK
- Execution Kernal
  - Ktools
  - GUL
  - FM
- Custom Model supplier Components

Data Standards
- Open Exposure Data
- API Schema
- Model Data Standards
- Model Meta-Data
- Open Results Data
- Configuration Options
- Transform Tools
- Transform Definitions

Legend:
- Oasis Software
- Oasis Maintenance
- External Components