

Come navigare la crisi nel continuo?

Ridurre il time-to-market attraverso un sistema di risk modeling e decisioning integrato ed innovativo

Supervision, Risks & Profitability
6 giugno 2023 – ABIEventi

Alida Popescu – Customer Advisory
Sr Manager Risk Management SAS



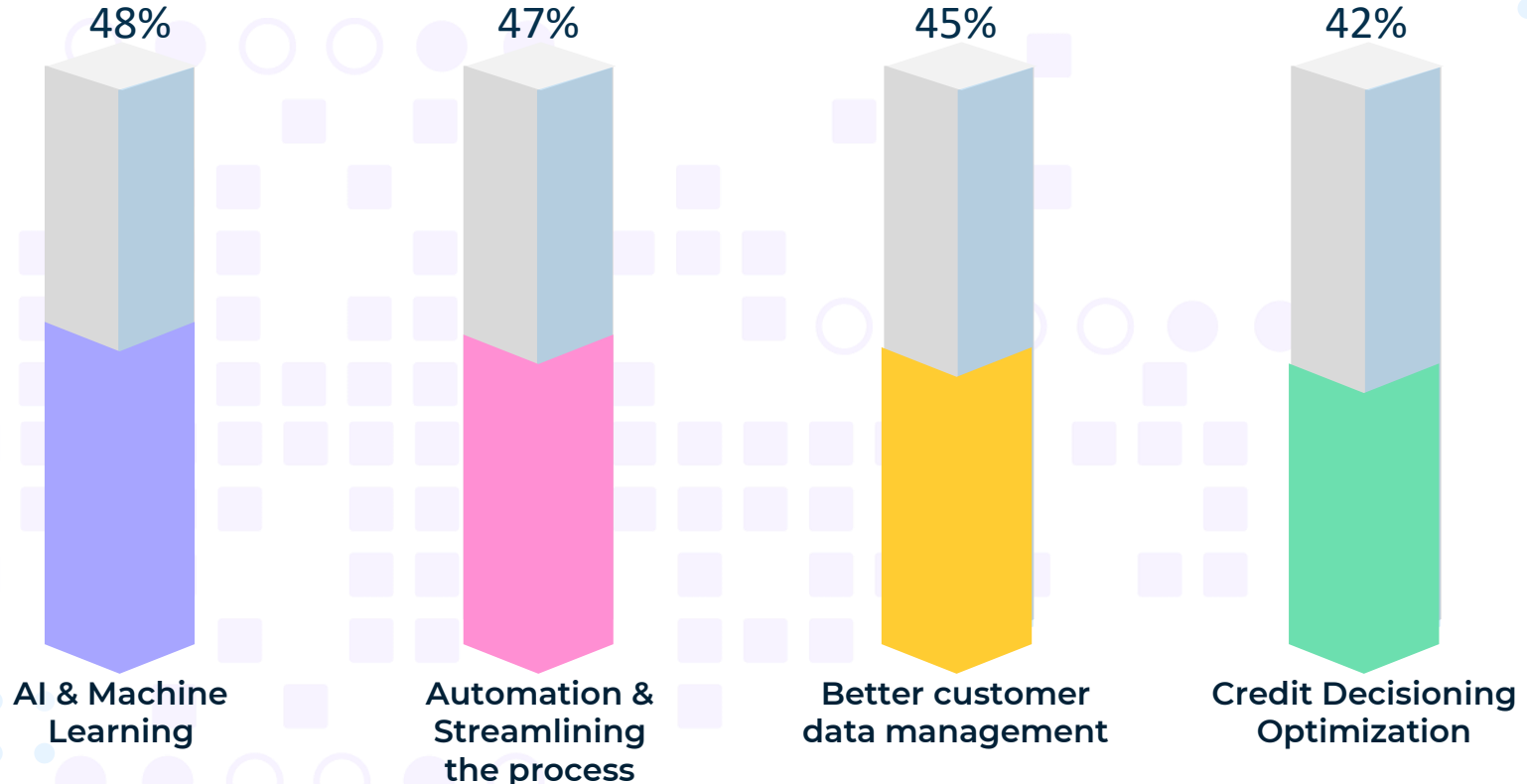
Agenda

- The value of Credit Risk Transformation and the role of AI GARP & SAS Research
- Why Kamakura is now SAS?
- SAS Kamakura Risk Information Services (KRIS)
- SAS Risk Modeling and Decisioning

Agenda

- ➔ The value of Credit Risk Transformation and the role of AI GARP & SAS Research
- ➔ Why Kamakura is now SAS?
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- ➔ SAS Risk Modeling and Decisioning

What are the top Credit Risk Transformation challenges?



Source: [THE STATE OF CREDIT RISK TRANSFORMATION IN BANKING | Research findings from GARP and SAS](#)

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The value of Credit Risk Transformation and the role of AI

WHERE ARE RISK PROS FOCUSED?

1

72%

Credit
Decisioning
optimization

2

68%

IT
infrastructure
modernization

3

53%

Better data
management

79%

HOW URGENT IS CRT TO INDUSTRY PROFESSIONALS?

Four out of five place
medium-to-high
priority
on CRT vs. other
organizational
transformations

Agenda



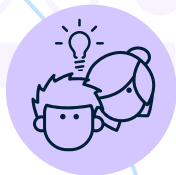
→ The value of Credit Risk Transformation and the role of AI
GARP & SAS Research

→ Why Kamakura is now SAS?

→ SAS Kamakura Risk Information Services (KRIS)

→ SAS Risk Modeling and Decisioning

Kamakura acquisition



Thought Leaders

Donald Van Deventer, Robert Jarrow and Martin Zorn are now part of SAS team leading the research and development of quantitative modeling



Innovation

The acquisition of Kamakura testifies SAS's ongoing commitment to functional and technological innovation, in line with market needs



Kamakura Risk Information Services (KRIS)

Industry leading quantitative credit risk measures such as default probabilities, implied spreads and implied ratings for corporate and sovereign counterparties – updated daily

https://www.sas.com/it_it/news/press-releases/2022/june/sas-acquires-kamakura-corp.html

CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

Overview Default Probabilities Bond Analytics CDS Ratings Chart Watch List Download

Credit Class Ticker

OVERVIEW

Please enter

- Public Firm
- Sovereign
- Sector Percentiles
- Credit Indices
- Portfolio

TICKER LOOKUP Close

Company Name

Search by Name Condition Begins with Country ALL

Ticker	Company	Country
5391	A & A MATERIAL CORP	JPN
7745	A & D CO LTD	JPN
AEF.MV.A	A & E CAPITAL FUNDING INC	CAN
AMFL	A & M FEBCON LIMIT	IND
001737	A & S GROUP HOLDIN	HKG
SODA.1	A & W BRANDS INC	USA
AMJBAG	A AND M JUMBO	IND
ABWG	A B WATLEY GROUP INC	USA
BRN	A BROWN CO INC BRN	PHL
DRWN	A CLEAN SLATE INC	USA
DRWN.1	A CLEAN SLATE INC -OLD	USA
ACM	A CUONG MINERAL GROUP JSC	VNM
ADAM.1	A D A M INC	USA
3250	A D WORKS CO LTD	JPN
AGORA	A GROUP OF RETAIL ASSETS	SWE

Default Probability Models (KDPs)

- Public Firms
- Sovereigns
- Structured Products
- Credit Indices
- Portfolios

Implied Ratings & Spreads

SAS Public Firm Model



CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

Portfolio Setup Default Probabilities Bond Analytics CDS Ratings Risk Map Correlations Troubled Company Index Download

Portfolio ALL Go Date 2023 May 10 Model KDP-jc7 Term 1 Year Country Italy Rating ALL Sector ALL

PROFILE

Profile Term Structure Risk Drivers By Security

Download

Record 1 to 355 of 355

Ticker	Company	Country	S&P Rating	KDP (%)	1 Day Chg	1 Mo Chg	3 Mo Chg	6 Mo Chg	1 Yr Chg	Pct
ZGN	ERMENEGILDO ZEGNA N V	ITA		0.11	0.00	0.00	+0.06	+0.03	-	0.24
COPN	COSMO PHARMACEUTICALS NV	ITA		0.11	0.00	0.00	+0.06	+0.04	-0.21	0.24
TGYM	TECHNOGYM SPA	ITA		0.11	+0.01	-0.02	+0.03	0.00	-0.10	0.24
STG	ALLCORE SPA	ITA		0.11	0.00	-0.02	+0.01	-0.02	-	0.23
ESAU	ESAUTOMOTION SPA	ITA		0.11	0.00	+0.01	+0.04	+0.02	-0.01	0.23
OJIM	OPENJOBMETIS SPA	ITA		0.11	0.00	0.00	0.00	0.01	-0.09	0.23
DLG	DE LONGHI SPA	ITA							-0.01	0.23
ABP	AZIENDA BRESCIANA PETROLI	ITA							-0.02	0.22
ALMEX	MEXEDIA SOCIETA PER AZIONI	ITA							-	0.22
LDO	LEONARDO SPA	ITA	BB+						-0.11	0.22
ACQ	ACQUAZZURRA S.P.A.	ITA							-	0.21
TISG	THE ITALIAN SEA GROUP S.P.A.	ITA							-	0.21
TYA	TOSCANA AEROPORTI SPA	ITA							0.00	0.21
ICF	INDUSTRIE CHIMICHE FORESTALI	ITA							-	0.21
COP	COPERNICO SIM SPA	ITA							-0.01	0.20
ERG	ERG SPA	ITA		0.09	-0.01	+0.01	+0.00	+0.00	+0.04	0.20
CEM	CEMENTIR HOLDING NV	ITA	BBB-	0.09	0.00	-0.01	+0.05	-0.01	-0.08	0.20

CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

Overview Default Probabilities Bond Analytics CDS Ratings Chart Watch List Download

Credit Class Sovereign ITALY Go Date 2023 May

ITALY

S&P Rating: BBB

Model	KDP (%)	1 Day Change	1 Month Change
KDP-SD6	0.19	0.00	-0.01

Compare: + Add - Remove Range: 1Mo 3Mo 6Mo 1Yr



Sovereign Ratings

CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

Hello: Alida | Logout

Overview Default Probabilities Bond Analytics CDS Ratings Chart Watch List Download

Credit Class: Sovereign | ITALY | Go | Date: 2023 | May | 10 | Term: 1 year

ITALY

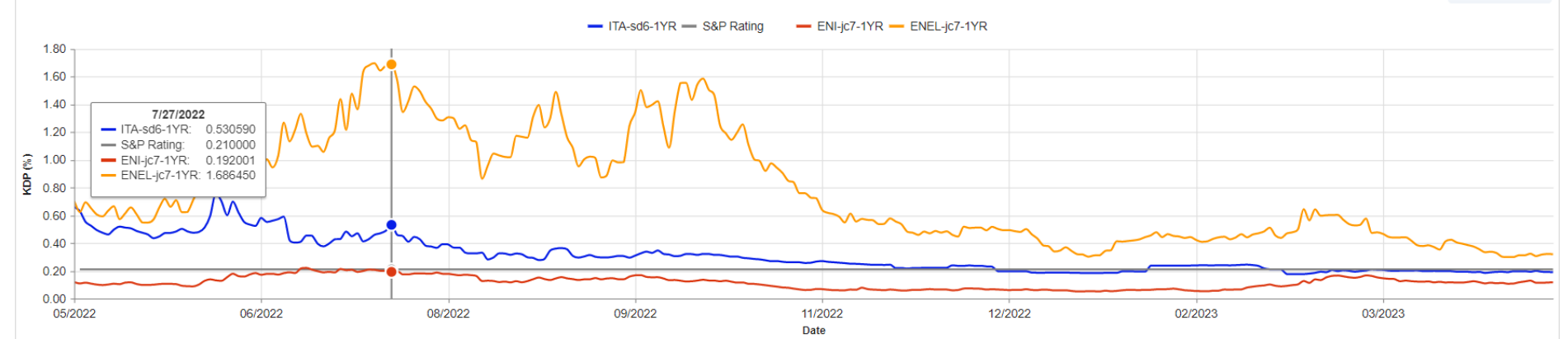
Profile Term Structure Risk Drivers Stress Test History

S&P Rating: BBB

S&P 1 Year Average Loss: [0.21 %]

Model	KDP (%)	1 Day Change	1 Month Change	3 Month Change	6 Month Change	1 Year Change
KDP-SD6	0.19	0.00	-0.01	-0.05	-0.08	-0.47

Compare: + Add - Remove Range: 1Mo 3Mo 6Mo 1Yr 2Yr 5Yr 10Yr Max Custom Date Scale: Normal Log Save As



Source: Kamakura Corporation

PD Term Structure

CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

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Overview Default Probabilities Bond Analytics CDS Ratings Chart Watch List Download

Credit Class Sovereign ITALY Go Date 2023 May 10 Term Annualized

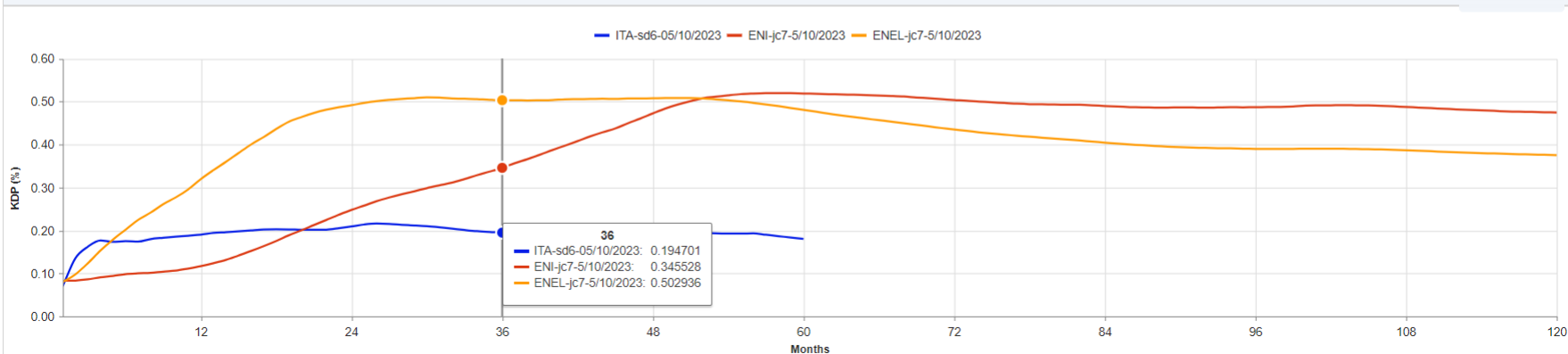
ITALY

Profile Term Structure Risk Drivers Stress Test History

Model	1 Mo (%)	3 Mo (%)	6 Mo (%)	1 Yr (%)	2 Yr (%)	3 Yr (%)	4 Yr (%)	5 Yr (%)	7 Yr (%)	10 Yr (%)
KDP-sd6	0.07	0.16	0.17	0.19	0.21	0.19	0.19	0.18	-	-

Compare: + Add - Remove

Scale: Normal Log Save As



Source: Kamakura Corporation

Risk Drivers – Contribution to KDP Change



Kamakura | Contact

CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT
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Overview Default Probabilities Bond Analytics CDS Ratings Chart Watch List Download

Credit Class: Sovereign | ITALY | Go | Date: 2023 | May | 10 | Model: KDP-sd6 | Term: 1 year

ITALY

[Profile](#) [Term Structure](#) [Risk Drivers](#) [Stress Test](#) [History](#)

KDP Change over 1 Year : ITA/SOV/SD6/1YR: -0.470536



Stress Testing and What-if Capabilities

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Overview **Default Probabilities** Bond Analytics CDS Ratings Chart Watch List Download

Credit Class Sovereign Date 2023 10

ITALY

KDP Value	1 Month	3 Month	6 Month	1 year	2 Year	3 Year	5 year
Current	0.07	0.16	0.17	0.19	0.21	0.19	0.18
User Defined	0.08	0.18	0.19	0.21	0.23	0.21	0.19
Difference	0.01	0.01	0.02	0.02	0.02	0.02	0.01

Country Specific	Actual Values	User Input	Country Specific	Actual Values	User Input
Debt/GDP	1.268673	<input type="text" value="1.268673"/>	10 year Treasury Yield	9.959582	<input type="text" value="9.959582"/>
Reserves/Debt	0.085071	<input type="text" value="0.085071"/>	FX Rate to USD - 1 year change	0	<input type="text" value="0"/>
Real GDP Growth (%)	1.557464	<input type="text" value="0.557464"/>	Unemployment Rate	8.3	<input type="text" value="10.3"/>
Percent of global GDP - 1 year change	-0.016446	<input type="text" value="-0.016446"/>	Median PD of Banking Sector	0.76615	<input type="text" value="0.76615"/>
GDP per capita (USD)	35657.5	<input type="text" value="35657.5"/>	Political Risk level	17.5	<input type="text" value="17.5"/>
Local/Foreign Currency Debt	765.6605	<input type="text" value="765.6605"/>	IMF Loans/Reserves	0	<input type="text" value="0"/>
Terms of Trade - 1 year change	-0.284574	<input type="text" value="-0.284574"/>	Loan from IBRD in past 5 years	No	<input type="text" value="No"/>

Credit Portfolio Setup

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CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

Portfolio Setup Default Probabilities Bond Analytics CDS Ratings Risk Map Correlations Troubled Company Index Download

Portfolio ABI Go Date 2023 May 29 Model KDP-jc7 Term 1 Year Country ALL Rating ALL Sector ALL

PROFILE

Profile Term Structure Risk Drivers By Security

Download

Record 1 to 19

Ticker	Company	Country	S&P Rating	KDP (%)	1 Day Chg	1 Mo Chg	3 Mo Chg	6 Mo Chg	1 Yr Chg	Pct
VOW	VOLKSWAGEN AG	DEU	BBB+	1.73	-0.09	-0.08	+0.85	+1.03	+0.76	0.95
ISP	INTESA SANPAOLO SPA	ITA	BBB	0.52	0.00	+0.02	+0.24	+0.08	-0.50	0.89
BPE	BPER BANCA SPA	ITA		0.34	0.00	-0.21	+0.10	-0.08	-0.65	0.84
A2A	A2A SPA	ITA	BBB	0.29	-0.01	-0.17	-0.10	-0.25	-0.01	0.79
ENEL	ENEL SPA	ITA	BBB+	0.26	-0.01	-0.03	-0.22	-0.29	-0.28	0.74
ITA	ITALY	SOV	BBB	0.23	0.00	+0.04	+0.02	+0.02	-0.23	0.68
POR	PORTUGAL	SOV	BBB+	0.23	0.00	+0.02	-0.01	-0.12	-0.29	0.63
UCG	UNICREDIT SPA	ITA	BBB	0.22	-0.01	-0.15	+0.07	+0.02	-0.57	0.58
IG	ITALGAS SPA	ITA		0.19	-0.01	+0.04	+0.05	+0.07	+0.10	0.53
ENI	ENI SPA	ITA	A-	0.10	0.00	-0.01	0.00	+0.04	0.00	0.47
GBR	UNITED KINGDOM	SOV	AA	0.09	0.00	+0.01	-0.02	-0.03	-0.05	0.42
FRA	FRANCE	SOV	AA	0.09	0.00	0.00	-0.01	-0.03	-0.07	0.37
BEL	BELGIUM	SOV	AA	0.04	0.00	+0.01	0.00	-0.01	-0.02	0.32
ATS	AUSTRIA	SOV	AA+	0.04	0.00	+0.01	0.00	0.00	0.00	0.26
USA	UNITED STATES OF AMERICA	SOV	AA+	0.03	0.00	0.00	+0.01	0.00	0.00	0.21
GER	GERMANY	SOV	AAA	0.02	0.00	0.00	0.00	0.00	+0.01	0.16
NED	NETHERLANDS	SOV	AAA	0.02	0.00	0.00	0.00	0.00	-0.01	0.11
NOR	NORWAY	SOV	AAA	0.00	0.00	0.00	0.00	0.00	0.00	0.05
LUX	LUXEMBOURG	SOV	AAA	0.00	0.00	0.00	0.00	0.00	0.00	0.00



Implied Ratings

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CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

Portfolio Setup Default Probabilities Bond Analytics CDS Ratings Risk Map Correlations Troubled Company Index Download

Portfolio ABI Go Date 2023 May 10 Model IR6 Country ALL Rating ALL Sector ALL

IMPLIED RATING

Future Rating Distribution Future Rating Upgrade/Downgrade Implied Rating User Rating Mapping

View By Issuer

Download

Record 1 to 9 of 9

Ticker	Company	Country	S&P Rating	Implied Rating	Difference
ENI	ENI SPA	ITA	A-	BBB+	-1
VOW	VOLKSWAGEN AG	DEU	BBB+	BBB+	0
BPE	BPER BANCA SPA	ITA		BBB+	
A2A	A2A SPA	ITA	BBB	BBB+	1
IG	ITALGAS SPA	ITA		BBB+	
UCG	UNICREDIT SPA	ITA	BBB	A	3
ISP	INTESA SANPAOLO SPA	ITA	BBB	A	3
ENEL	ENEL SPA	ITA	BBB+	A	2
AAPL	APPLE INC	USA	AA+	A+	-3

First Previous Next Last

Implied Rating Distribution

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CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

Overview Default Probabilities Bond Analytics CDS Ratings Chart Watch List Download

Credit Class Public Firm Ticker ENI Italy Go Date 2023 May 10 Model IR6

ENI SPA

Future Rating Distribution Future Rating Term Structure Implied Rating Distribution Implied Rating History

Most Likely Rating: **BBB+**

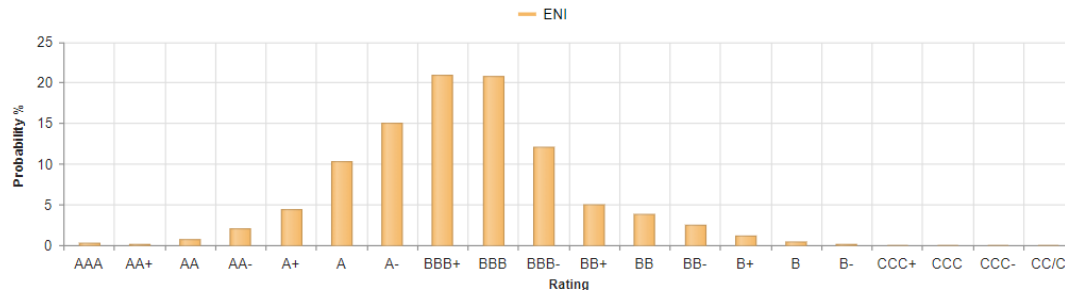
S&P Rating: **A-**

Probability of:

Investment Grade 87.01%
Non-Investment Grade 12.99%

Implied Rating

Save As



Source: Kamakura Corporation

Distribution	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+	B	B-	CCC+	CCC	CCC-	CC/C
Probability	0.2	0.1	0.8	2.0	4.4	10.4	15.0	21.0	20.9	12.2	5.0	3.8	2.5	1.1	0.5	0.1	0.0	0.0	0.0	0.0
Cumulative	0.2	0.4	1.2	3.2	7.6	18.0	33.0	54.0	74.8	87.0	92.0	95.8	98.2	99.4	99.8	100.0	100.0	100.0	100.0	100.0

Credit Name - KDP, Term Structure

CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT Hello: Alida | Logout

Overview Default Probabilities Bond Analytics CDS Ratings Chart Watch List Download

Credit Class Public Firm Ticker ENI Italy Go Date 2023 May 30 Term Annualized

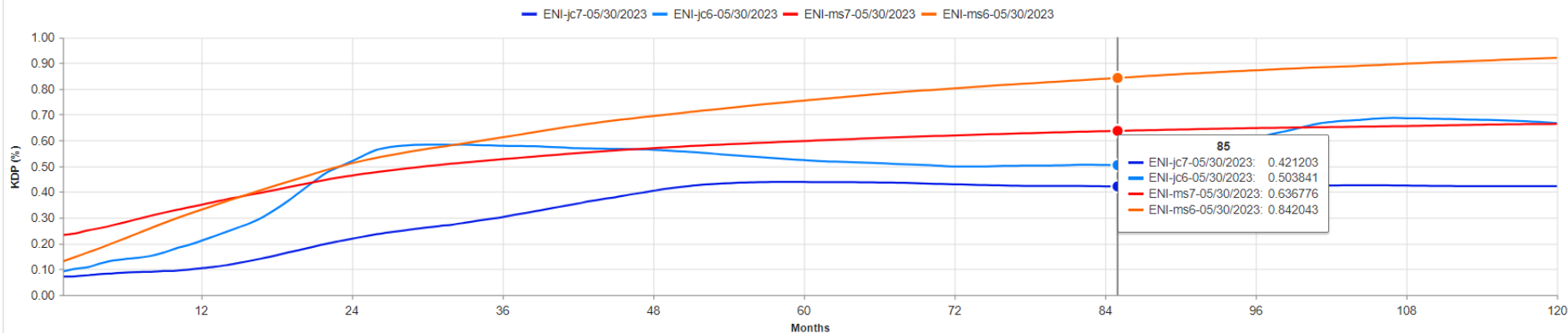
ENI SPA

Profile Term Structure Risk Drivers Factor Percentiles Stress Test History

Model	1 Mo (%)	3 Mo (%)	6 Mo (%)	1 Yr (%)	2 Yr (%)	3 Yr (%)	4 Yr (%)	5 Yr (%)	7 Yr (%)	10 Yr (%)
KDP-jc7	0.07	0.08	0.09	0.10	0.22	0.30	0.40	0.44	0.42	0.42
KDP-jc6	0.09	0.11	0.14	0.21	0.52	0.58	0.56	0.52	0.50	0.67
KDP-ms7	0.23	0.25	0.28	0.35	0.46	0.53	0.57	0.60	0.64	0.66
KDP-ms6	0.13	0.17	0.22	0.33	0.51	0.61	0.69	0.75	0.84	0.92

Compare: + Add - Remove

Scale: Normal Log Save As



Source: Kamakura Corporation

Troubled Company Index

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CREDIT NAME CREDIT PORTFOLIO MACRO FACTOR SENSITIVITY PORTFOLIO MANAGEMENT

Portfolio Setup Default Probabilities Bond Analytics CDS Ratings Risk Map Correlations Troubled Company Index Download

Portfolio TC INDEX Date 2023 May 30 Go Model KDP-jc7 Term 1 Month

TROUBLED COMPANY INDEX

Troubled Company Index Expected Cumulative Default Rate

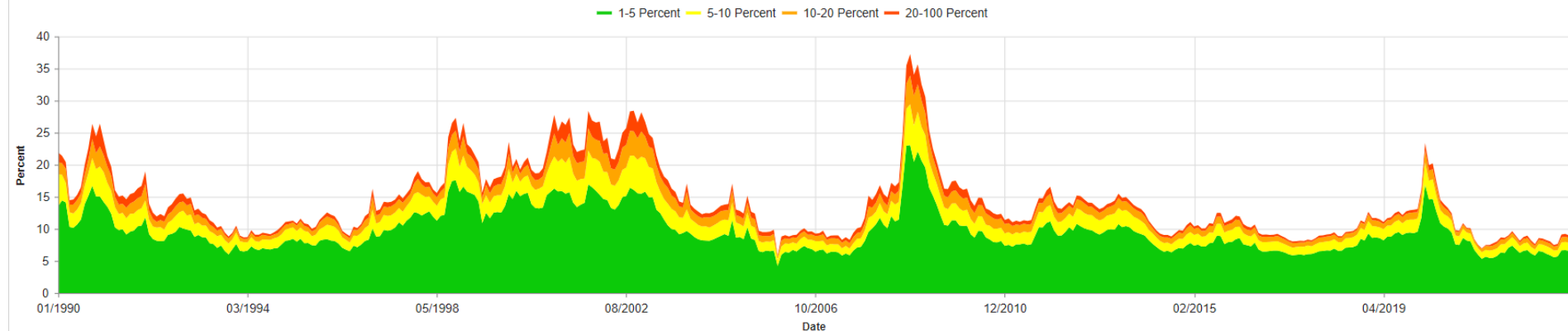
Current Index Value: **8.95** Period Percentile Rank: **12.28%** Period Average: **14.31** Period High: **41.79 (11/20/2008)** Period Low: **5.85 (12/30/2005)**

Description	% of Universe	1 Day Change	1 Month Change	3 Month Change	6 Month Change	1 Year Change
KDP > 1%	8.95	-0.17	-0.26	1.32	0.75	0.43
KDP > 5%	2.39	-0.08	-0.16	0.44	0.30	0.31
KDP > 10%	1.15	-0.05	-0.10	0.17	0.23	0.21
KDP > 20%	0.39	-0.03	-0.06	0.08	0.11	0.07

Range: 1Mo 3Mo 6Mo 1Yr 2Yr 5Yr 10Yr Max Custom Date

Download

Save As

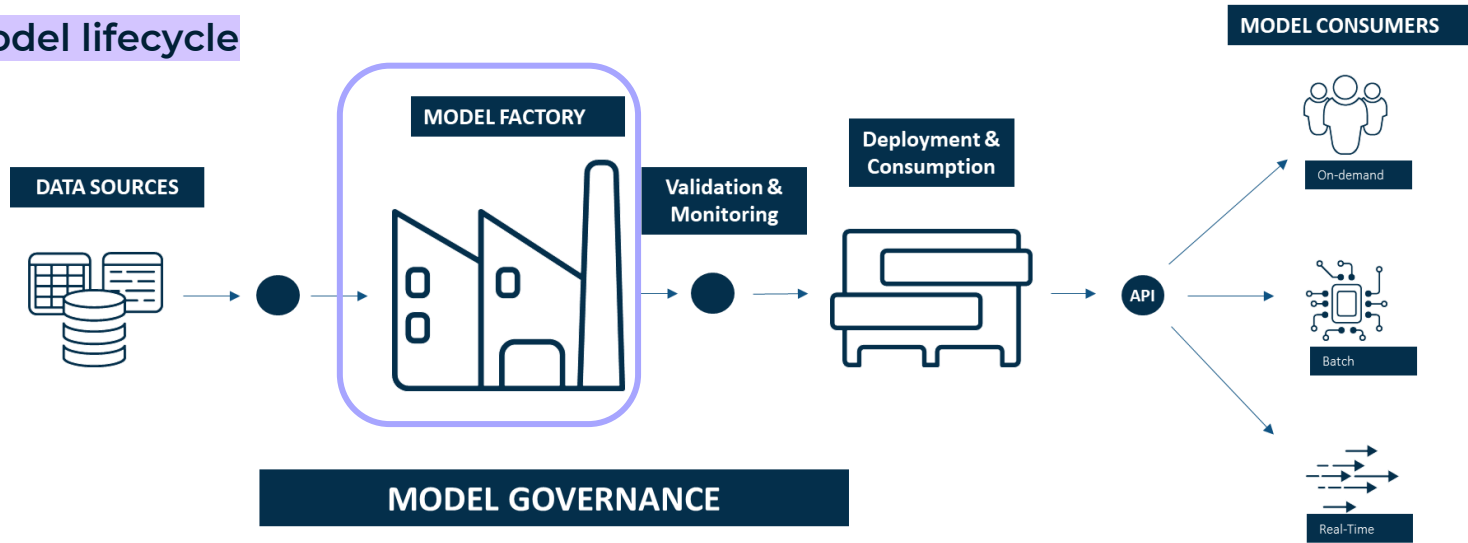


Agenda

- The value of Credit Risk Transformation and the role of AI GARP & SAS Research
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- SAS Kamakura Risk Information Services (KRIS)
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SAS approach to Risk Modeling & Decisioning

the risk model lifecycle



Achieve both speed and scale at a reasonable cost



Lack of scalability can translate in missed opportunities



Velocity and volume of decisions will continue to increase

SAS approach to Risk Modeling & Decisioning

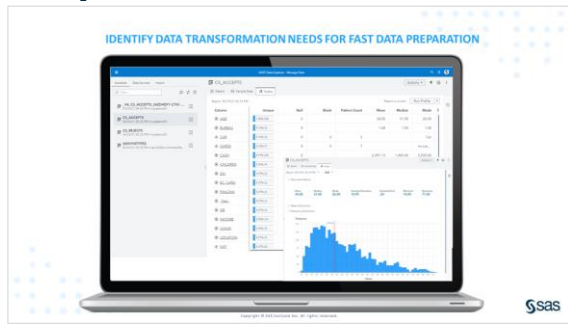
automated, lean development

Visual, Code-only or mixed approach

 Model Factory



Prepare



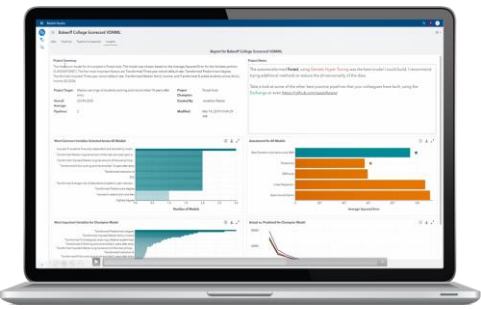
Accelerate

GOVERN DATA PROCESS FOR RELIABLE AND TIMELY RESULTS



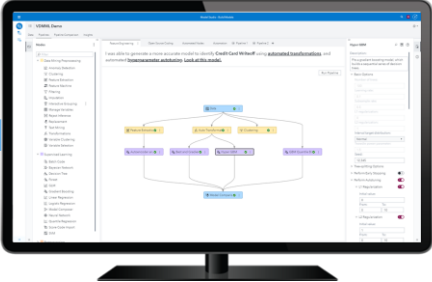
Explain

ASSESS AND INTERPRET GOODNESS OF MODEL FOR IMPROVED ACCURACY



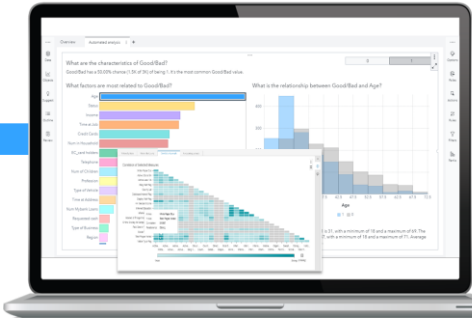
Develop

AUTOMATE MODEL BUILDING AND PIPELINE GENERATION



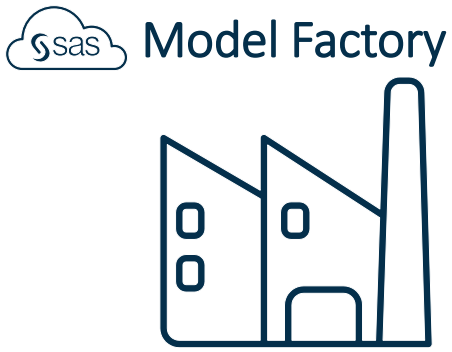
Explore

DISCOVER RELATIONSHIPS, TRENDS AND OUTLIERS

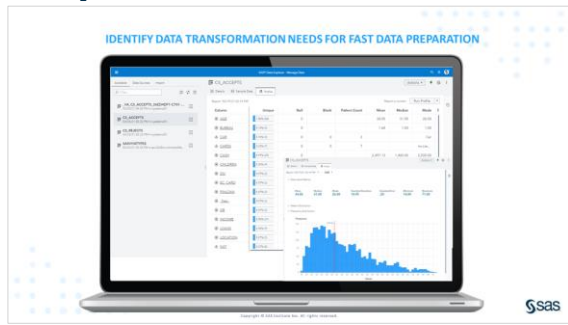


SAS approach to Risk Modeling & Decisioning

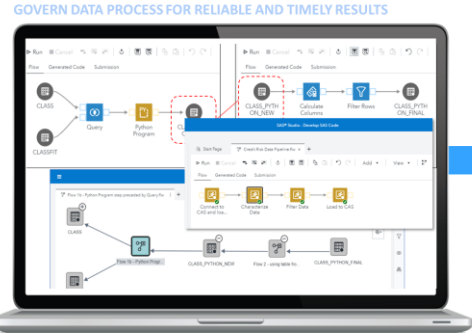
automated, lean development
Visual, Code-only or mixed approach



Prepare



Accelerate



Explain

ASSESS AND INTERPRET GOODNESS OF MODEL FOR IMPROVED ACCURACY

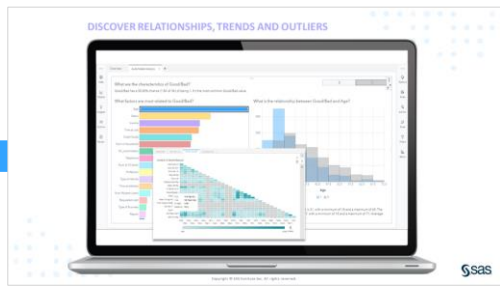


Develop

AUTOMATE MODEL BUILDING AND PIPELINE GENERATION Accelerate Analytics

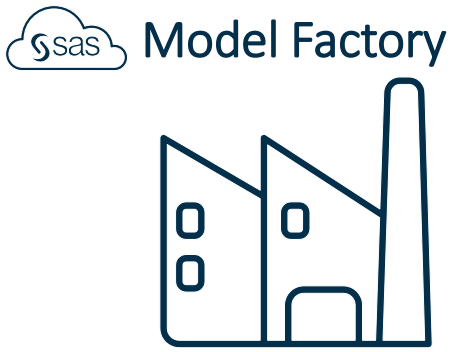


Explore

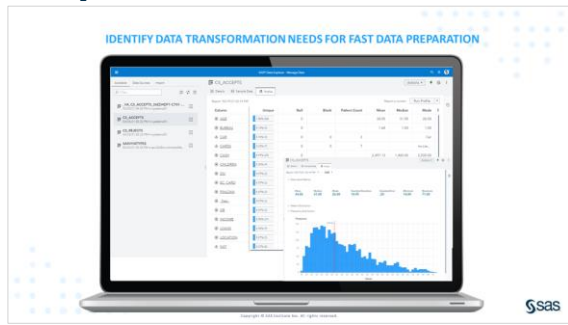


SAS approach to Risk Modeling & Decisioning

automated, lean development
Visual, Code-only or mixed approach



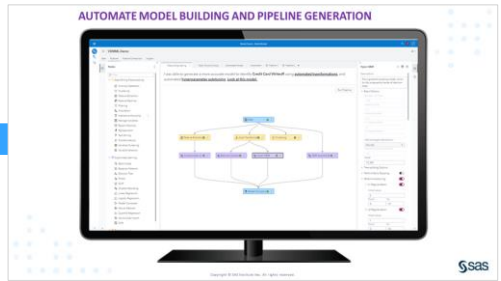
Prepare



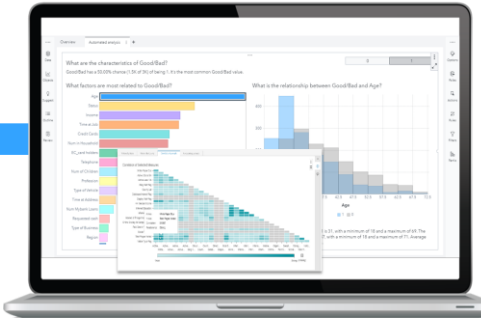
Accelerate



Develop



Explore



Explain

ASSESS AND INTERPRET GOODNESS OF MODEL FOR IMPROVED ACCURACY



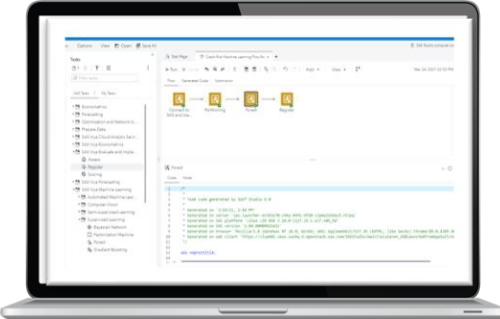
Several integration points for coding languages

A common framework for Open Source, SAS and SAS GUI models

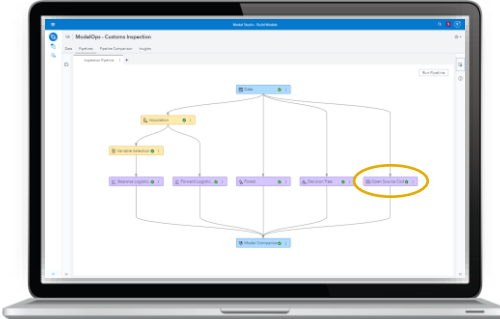
Model Factory



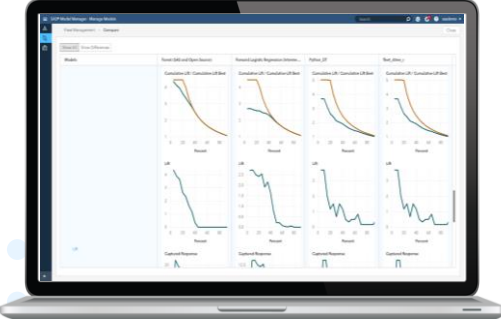
Inject Python code in data preparation flows



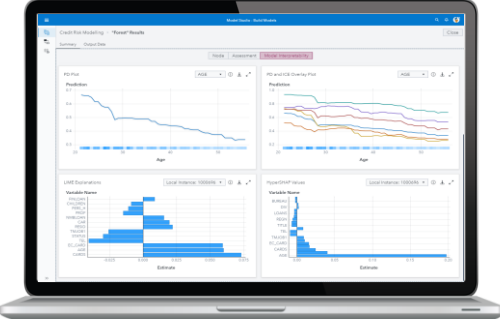
Copy Python/R code in model development pipeline



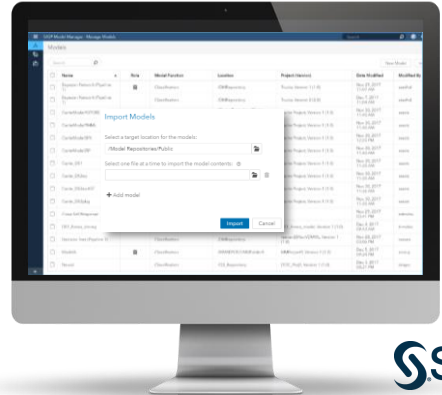
Compare models of different coding languages and SAS GUI



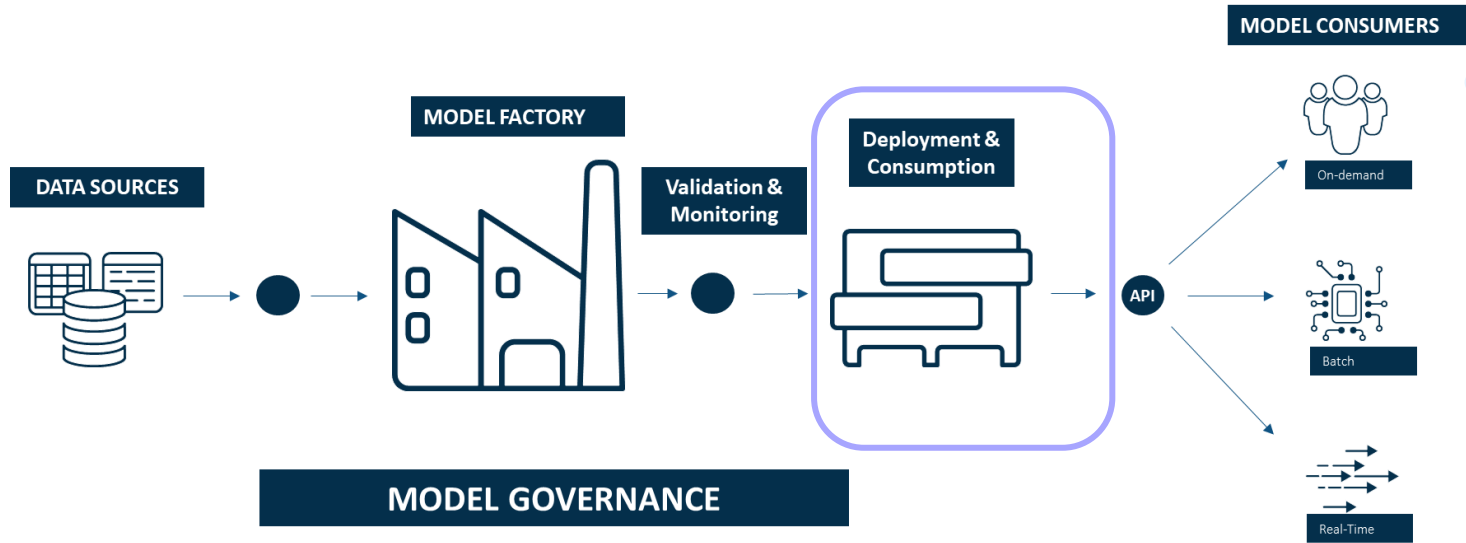
Interpret AI/ML models (incl. fairness and bias) from different coding languages



Register, deploy and monitor SAS and OS models



SAS approach to Risk Modeling & Decisioning



Achieve both speed and scale at a reasonable cost



Lack of scalability can translate in missed opportunities



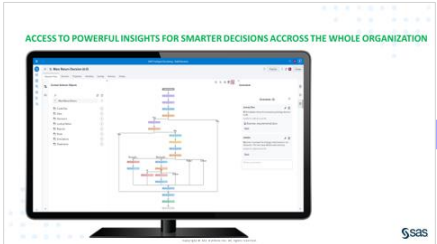
Velocity and volume of decisions will continue to increase

Automated, lean model consumption & execution

Smooth model deployment in Batch, in-DB and real-time incl. container

Model Execution

Decision



SAS Real-time Scoring / Decisioning



Batch execution



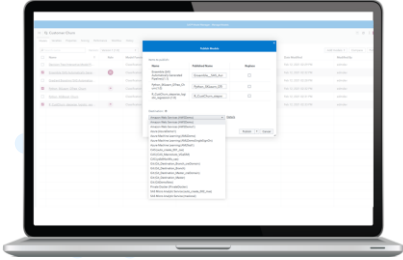
ANALYSE AND VALIDATE THE RESULT OF DECISIONS GRAPHICALLY



REST API



GET MODELS INTO PRODUCTION FASTER WITHOUT REWORK LIKE RECODING



Git Check & Test

Examples:

- RWA Engine
- ALM Credit Model & EC
- Other Engines



Main benefits our single platform guarantees

Business Value

Operational efficiency

Speed of time-to-model

Transparency and Future/proof

Keeping up with regulation

Scalability

Features

Governed, quality assured model manufacturing

Highly automated, collaborative, lean design

Code integration from various coding languages

Effective central control across the group units

Cloud-native, containerization



Grazie!