

Planning and managing costs

UNDERSTANDING MICROSOFT AZURE MANAGEMENT AND GOVERNANCE



Maarten Van den Broeck

Senior Content Developer at DataCamp

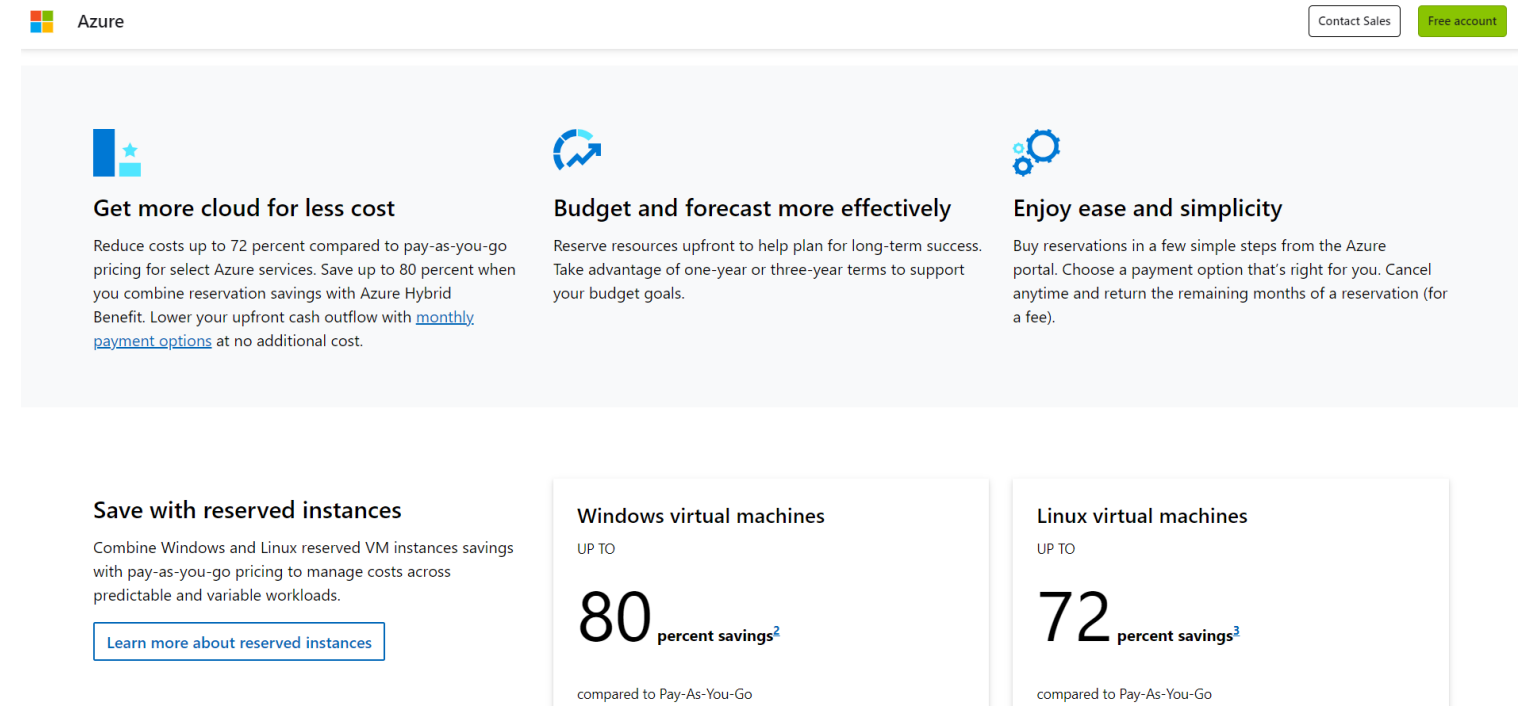
Factors that affect costs

- **Consumption**
 - Using resources leads to costs
- **Subscription type**
 - Depending on subscription type, there might be allowances or free products
- **Resource type and settings**
 - Resources can have higher tiers that increase costs
- **Azure region**
 - Regional pricing differs, and data transfers to other regions are more expensive



Ways to manage costs

- **Maintenance and monitoring:** find underused or over-expensive resources
- **Other pricing models:** short-term flexibility vs. long-term engagement
- **Geography:** minimize inter-regional data transfers
- **Cost management tools:** cost estimation, budgets, and alerts



The screenshot displays the Azure website's cost management section. At the top, the Azure logo is on the left, and 'Contact Sales' and 'Free account' buttons are on the right. The main content area features three primary cards: 'Get more cloud for less cost' (with a bar chart icon), 'Budget and forecast more effectively' (with a line graph icon), and 'Enjoy ease and simplicity' (with a gear icon). Below these, there are three more cards: 'Save with reserved instances' (with a link to learn more), 'Windows virtual machines' (showing up to 80% savings), and 'Linux virtual machines' (showing up to 72% savings). All savings percentages are compared to Pay-As-You-Go pricing.

Get more cloud for less cost
Reduce costs up to 72 percent compared to pay-as-you-go pricing for select Azure services. Save up to 80 percent when you combine reservation savings with Azure Hybrid Benefit. Lower your upfront cash outflow with [monthly payment options](#) at no additional cost.

Budget and forecast more effectively
Reserve resources upfront to help plan for long-term success. Take advantage of one-year or three-year terms to support your budget goals.

Enjoy ease and simplicity
Buy reservations in a few simple steps from the Azure portal. Choose a payment option that's right for you. Cancel anytime and return the remaining months of a reservation (for a fee).

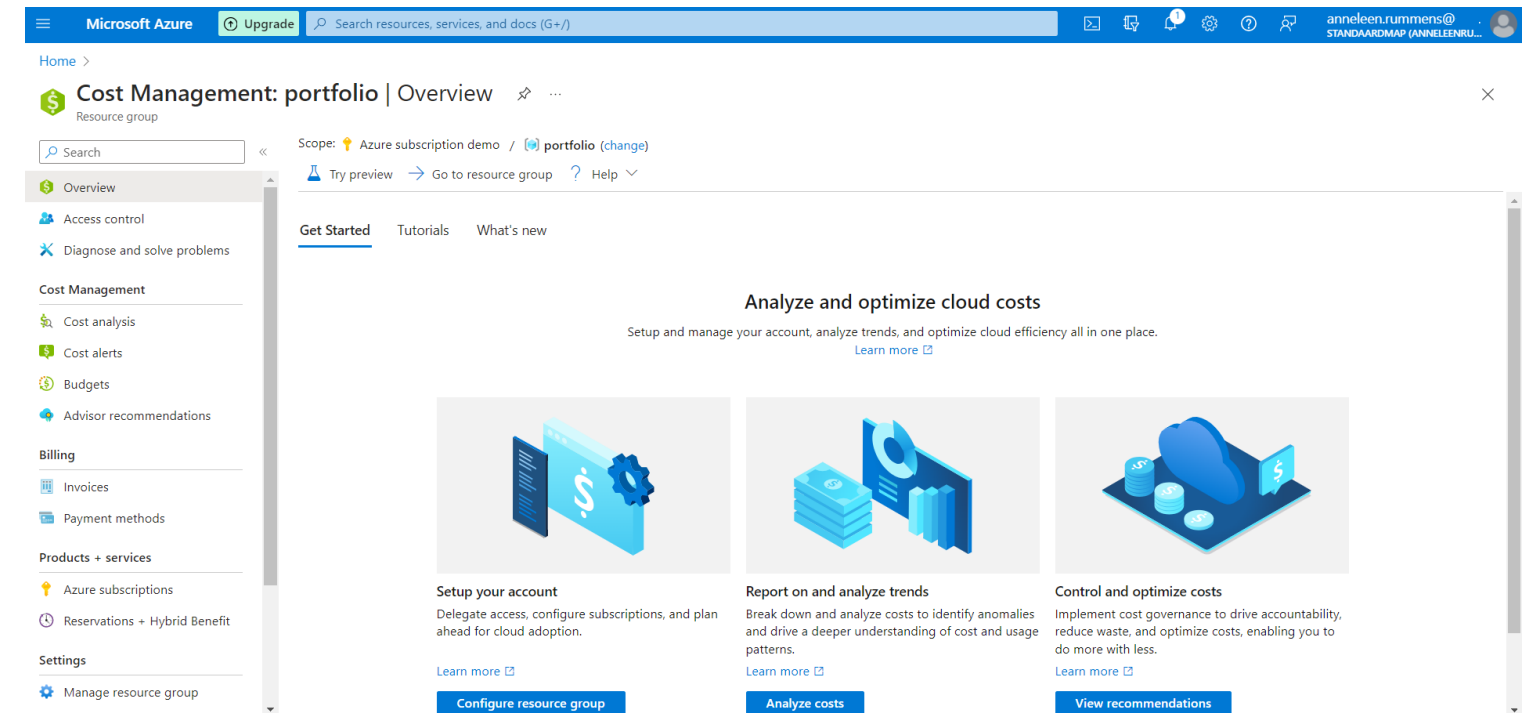
Save with reserved instances
Combine Windows and Linux reserved VM instances savings with pay-as-you-go pricing to manage costs across predictable and variable workloads.
[Learn more about reserved instances](#)

Windows virtual machines
UP TO
80 percent savings²
compared to Pay-As-You-Go

Linux virtual machines
UP TO
72 percent savings³
compared to Pay-As-You-Go

Cost management tasks

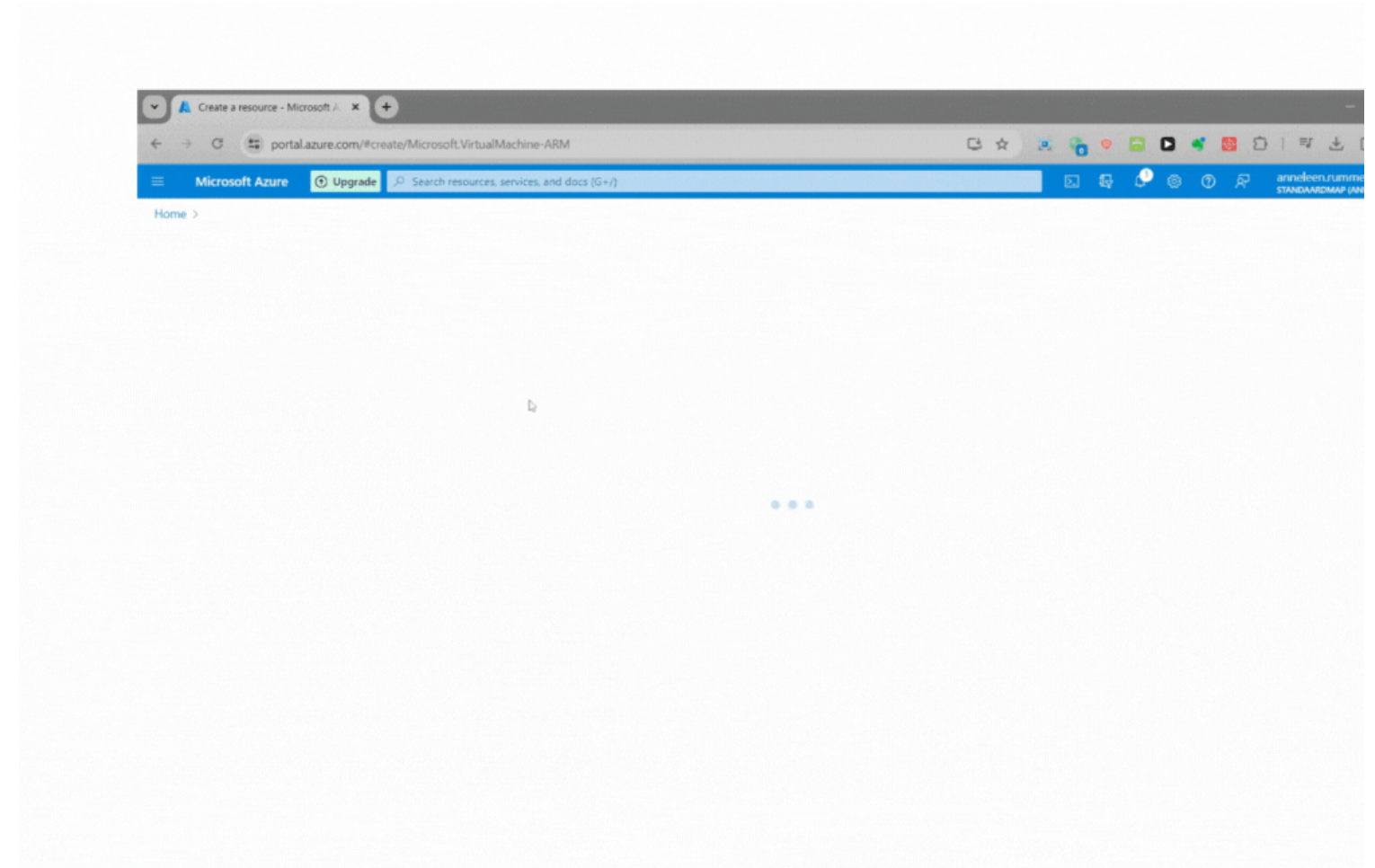
- Compare costs for running on-premises infrastructure vs. Azure cloud
- Estimate cost for provisioning resources in Azure
- Analyze costs
- Set up budgets and automatic alerts



Example use case: costs of a virtual machine (VM)

For your data project, you create a new VM in Azure, balancing the requirements for the project with budget limits

- You can estimate the costs of the VM and other needed resources beforehand
- Azure informs you of the cost per month when creating the VM and choosing its size
- Once the VM is created, you can also monitor costs and usage



Let's practice!

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Cost management tools

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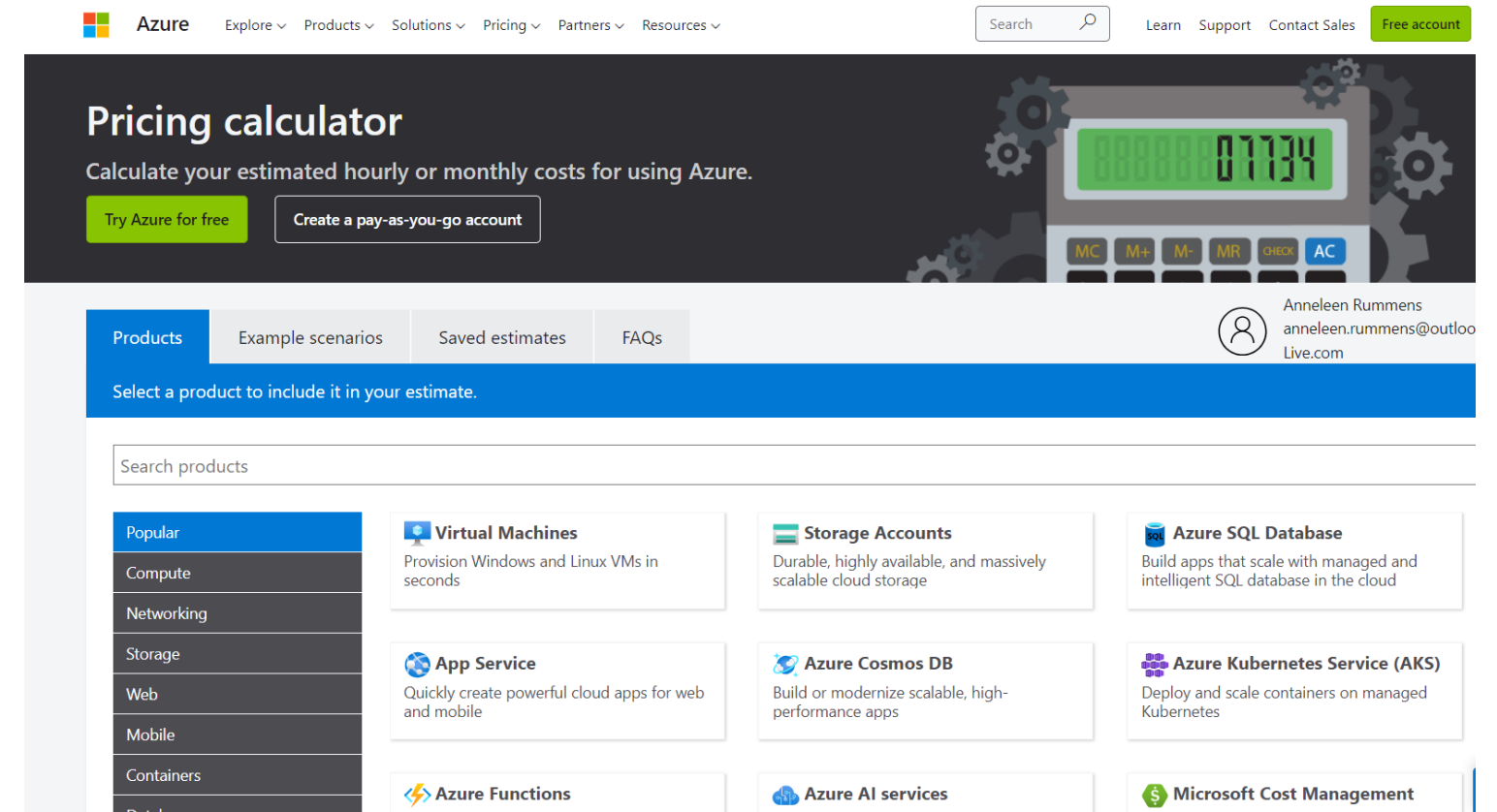
Cost management tools overview

Tool	Use
Pricing Calculator	Estimate costs of a specific resource configuration in Azure
TCO Calculator	Compare the total cost of on-premises infrastructure with the same configuration in Azure Cloud
Cost Management	Provides users with insights and controls to monitor, analyze, and optimize costs

Pricing Calculator

Used to estimate costs of a specific resource configuration in Azure

- Freely available
- Estimates costs of individual resources or services or a specific combination
- Template scenarios: e.g., big data analytics set-up



TCO calculator

Compare the total cost of on-premises infrastructure with the same configuration in Azure Cloud

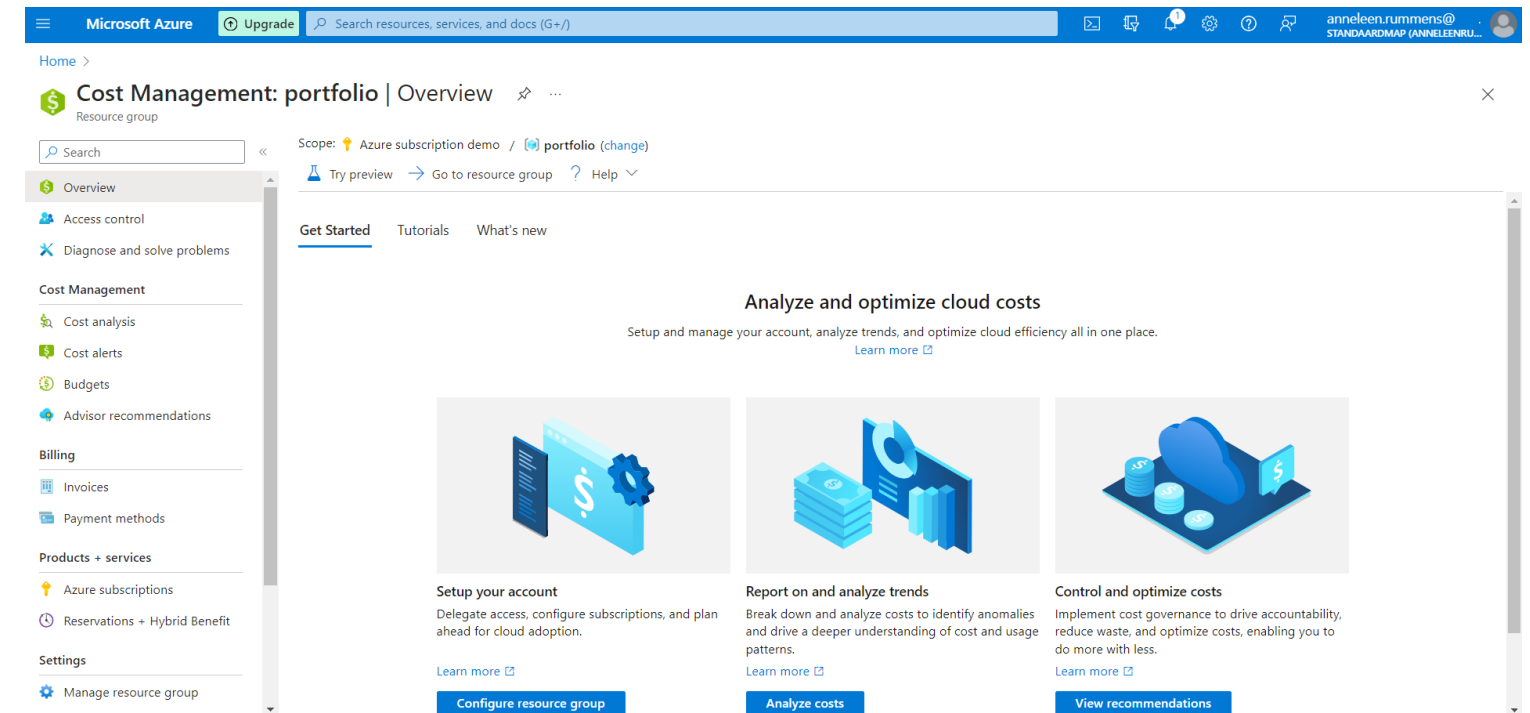
- TCO = total cost of ownership including hidden costs like operating costs
- Freely available
- Used to support migration to Azure

The screenshot shows the Azure TCO Calculator web application. At the top is the Azure navigation bar with links for Explore, Products, Solutions, Pricing, Partners, and Resources. A search bar and links for Learn, Support, Contact Sales, and a Free account button are also present. The main header reads "Total Cost of Ownership (TCO) Calculator" with the subtitle "Estimate the cost savings you can realize by migrating your workloads to Azure". Below this is a feedback prompt: "Help us improve. Is the TCO calculator helpful?" with "Yes" and "No" buttons. A progress bar indicates three steps: 1. Define your workloads, 2. Adjust assumptions, and 3. View report. The first step is active. Below the progress bar are links for Bulk Upload, My saved reports, and a user profile for Anneleen Rummens. The main content area is titled "Define your workloads" and includes instructions: "Enter the details of your on-premises workloads. This information will be used to understand your current TCO and recommended services in Azure." Under the "Servers" section, it says "Enter the details of your on-premises server infrastructure. After adding a workload, select the workload type and enter the remaining details." and provides a link to "+ Add server workload".

Cost Management

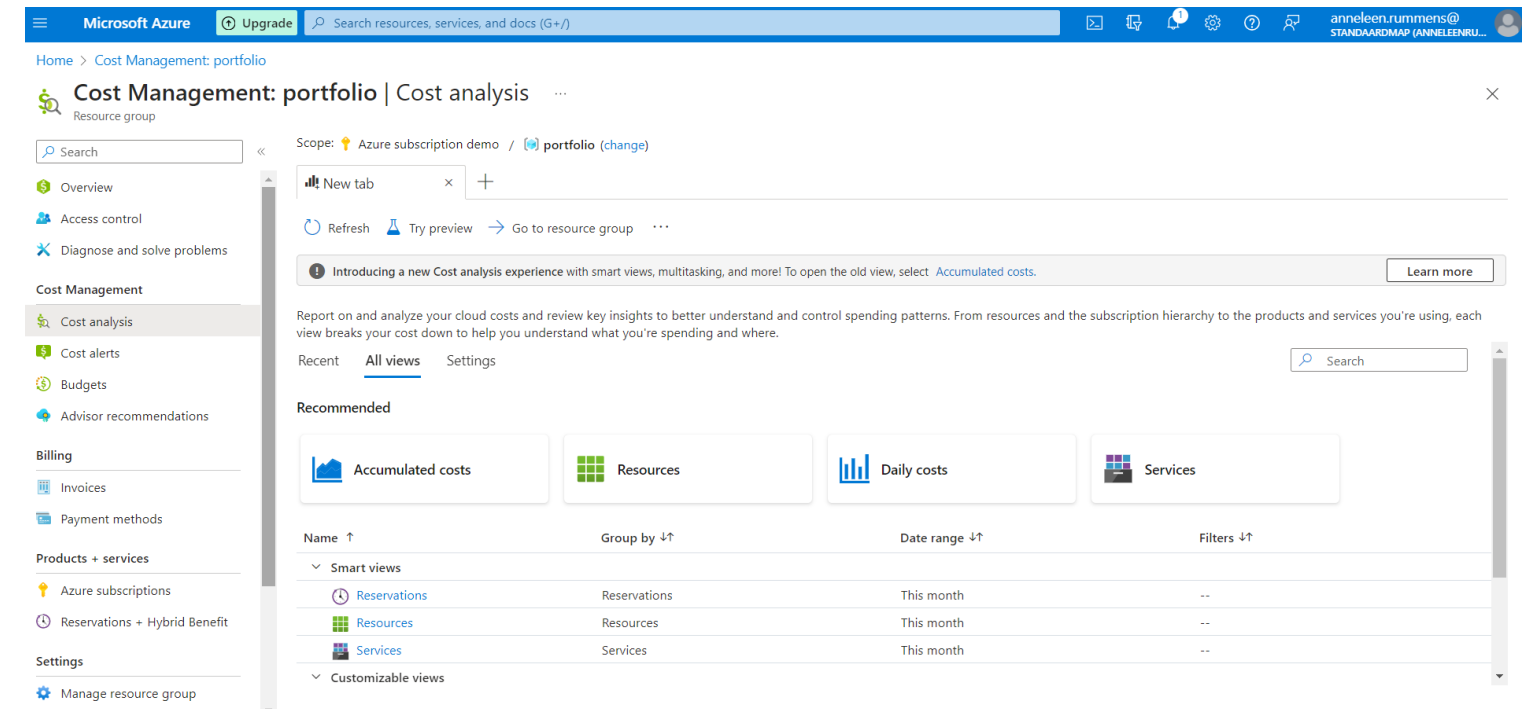
Central hub in Azure for all things cost-related

- Set up budgets and cost alerts
- Manage billing options and invoices
- API for exporting cost details to external systems
- Analyze costs with **Cost Analysis** tool



Cost Management: Cost Analysis tool

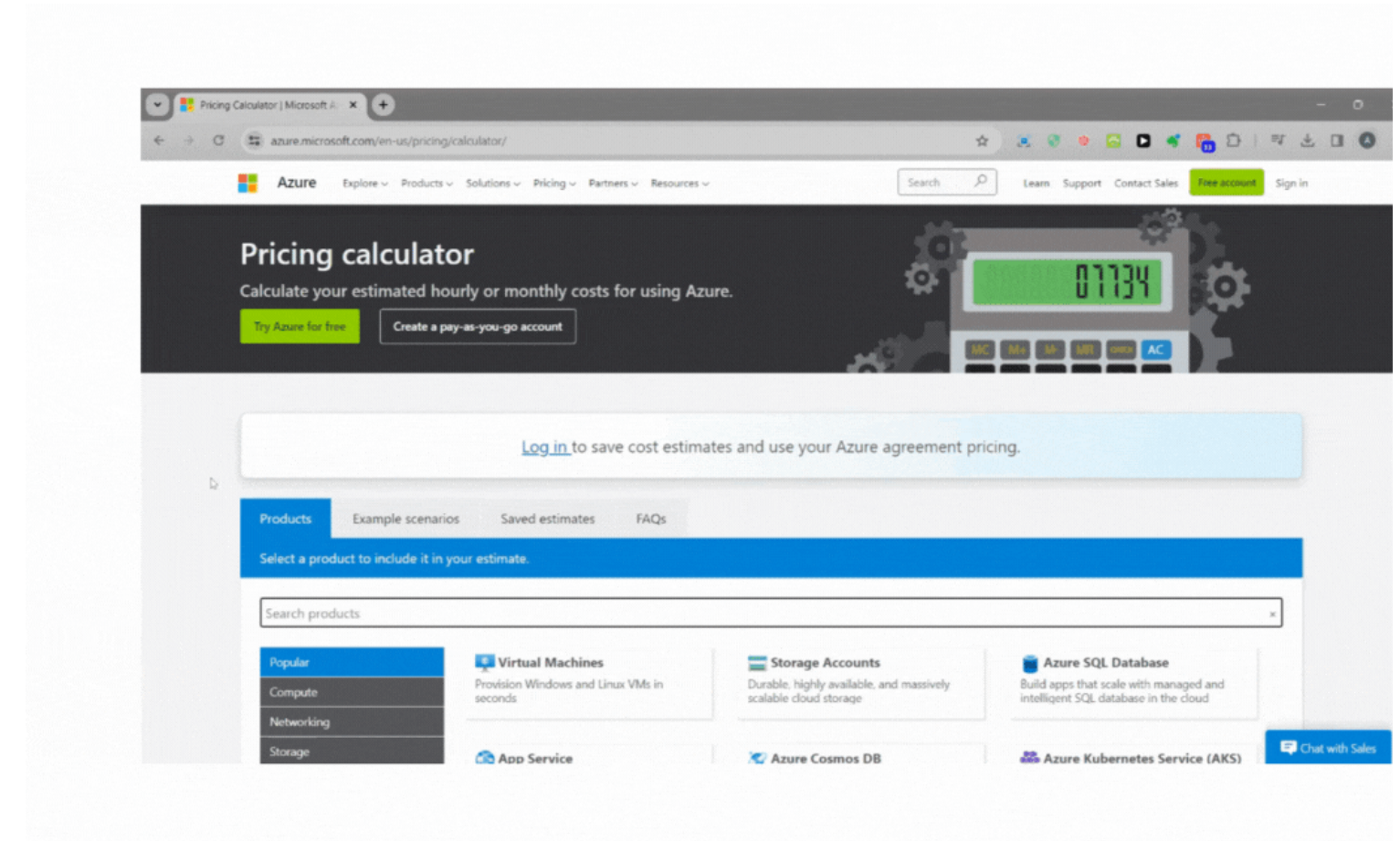
- Tool for ad-hoc cost exploration
- Custom visualization and filters
- Cost forecasts
- For more advanced analysis: connect to Power BI



Example use case: costs of a virtual machine (cont.)

For your data project, you create a new VM in Azure, balancing the requirements for the project with budget limits

- **Pricing calculator:** estimate VM and other resource costs beforehand
- Cost per month is given when creating the VM and choosing its size
- Monitor costs and usage in **Cost Management**



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Governance and compliance implementation

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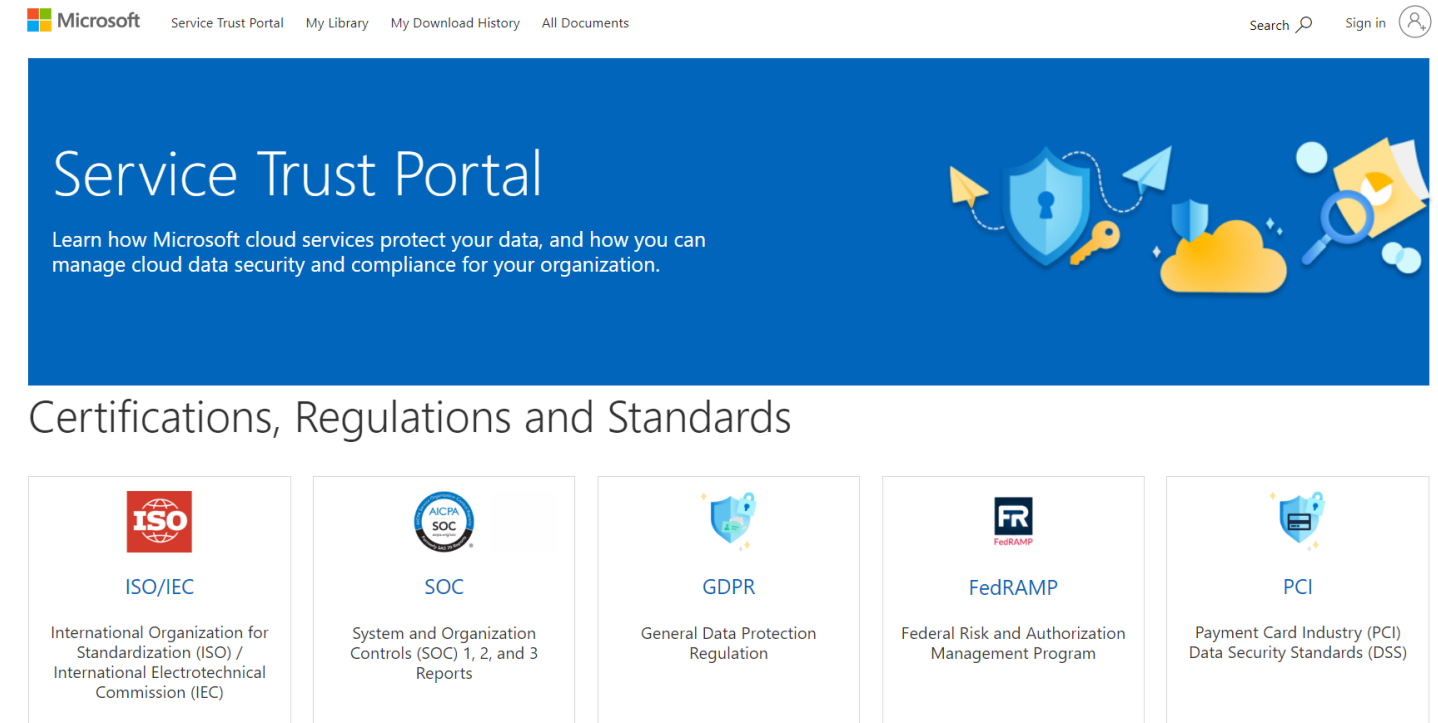


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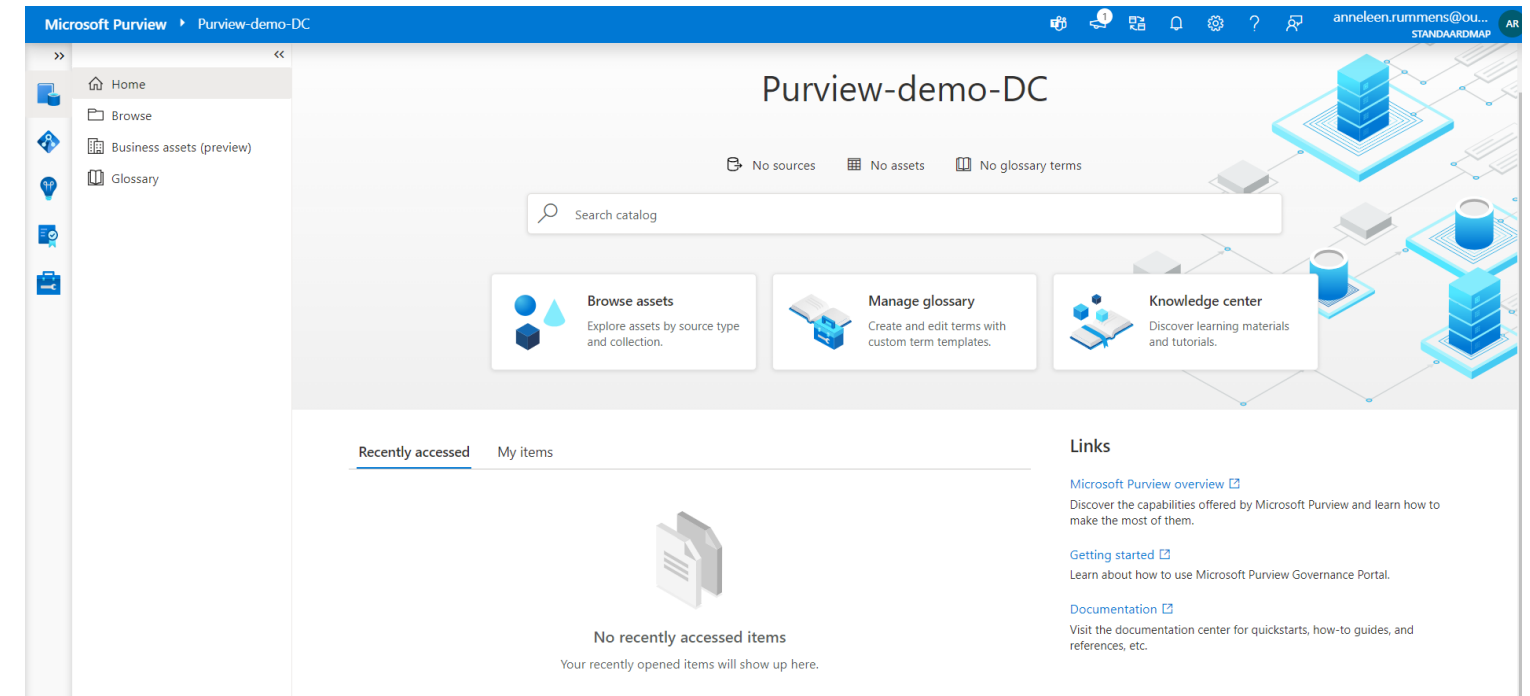
Service Trust Portal

- Details Microsoft's security, privacy and compliance practices related to the Azure cloud environment
- Resources and documentation on risk assessment and compliance best practices
 - Certifications (e.g., ISO, GDPR)



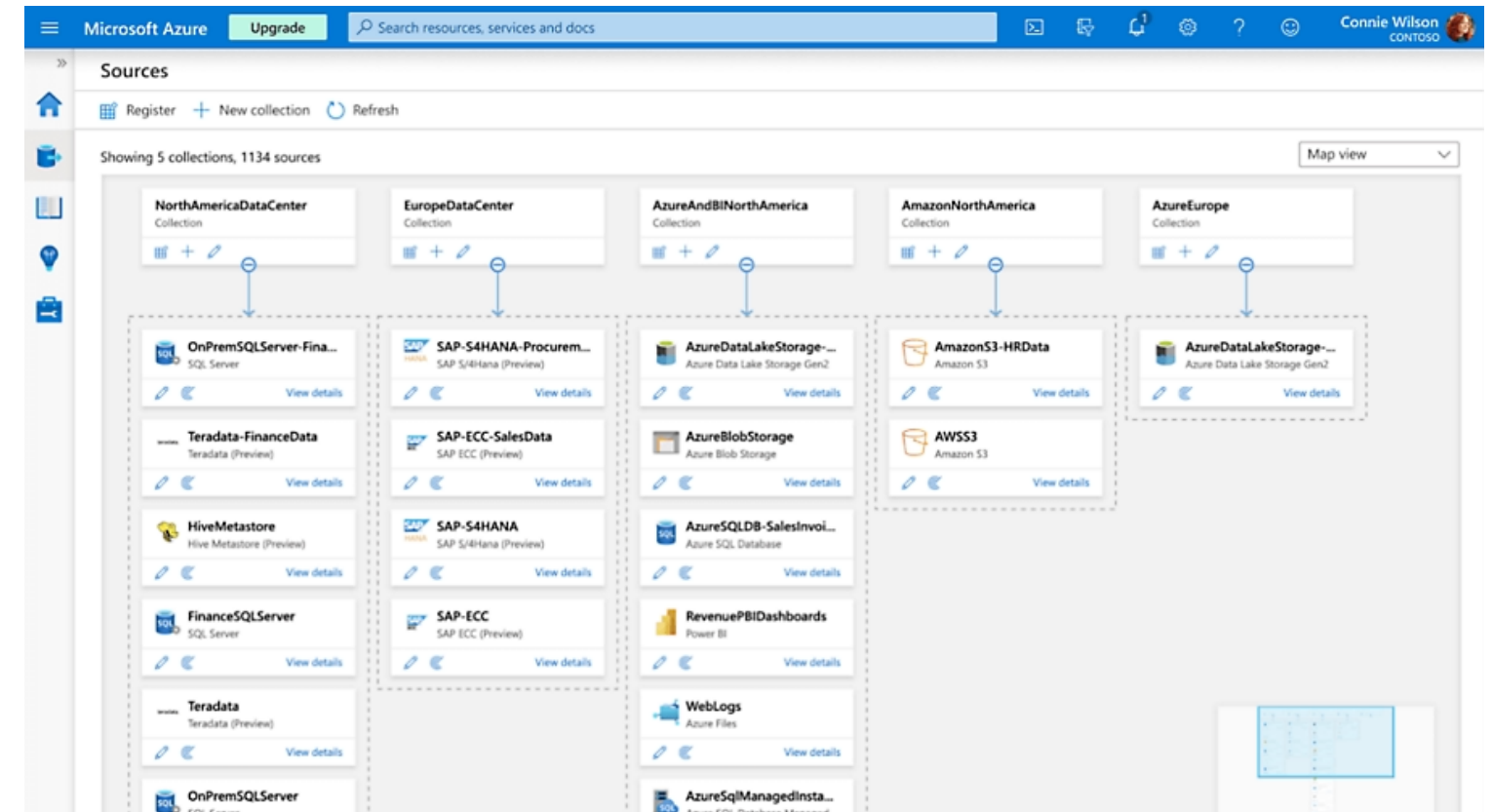
Microsoft Purview

- Comprehensive data management service for Azure and other Microsoft products
- Combination of previous Azure Purview with Microsoft 365 Compliance
- Specific focus on managing data assets:
 - Data security
 - Data governance
 - Data risk & compliance



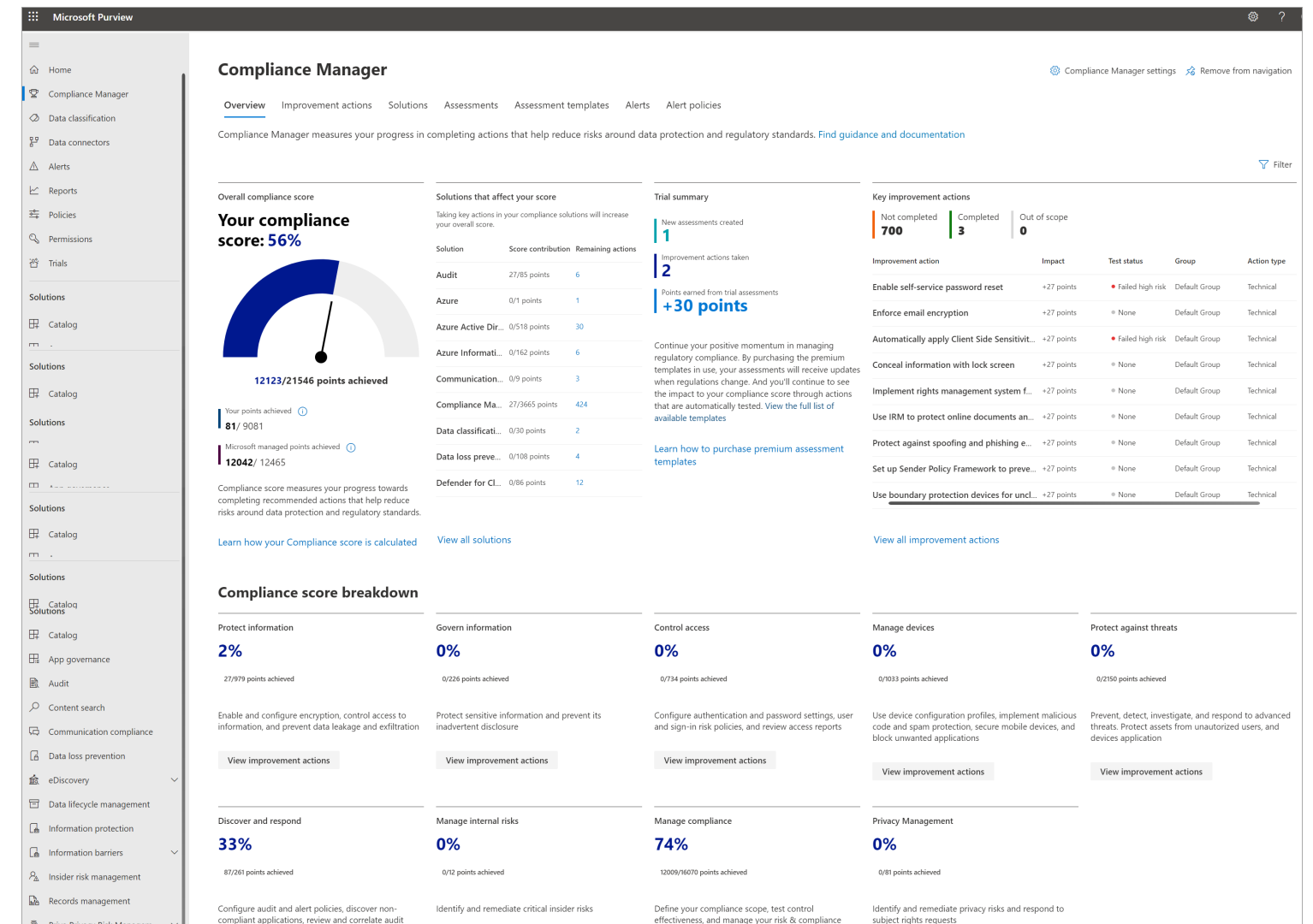
Microsoft Purview use cases

- **Data Catalog:** centralized overview of all data assets and their metadata
- **Data Map:** visual representation of data flows through systems and applications
- Data labeling, classification, and metadata enrichment
- Support for data transfer and sharing



Microsoft Purview: Compliance Manager

- Dashboard to assess current compliance status with a specific set of regulations
 - Current compliance status summarized with a scoring system
 - Recommendations to improve compliance and reduce risks

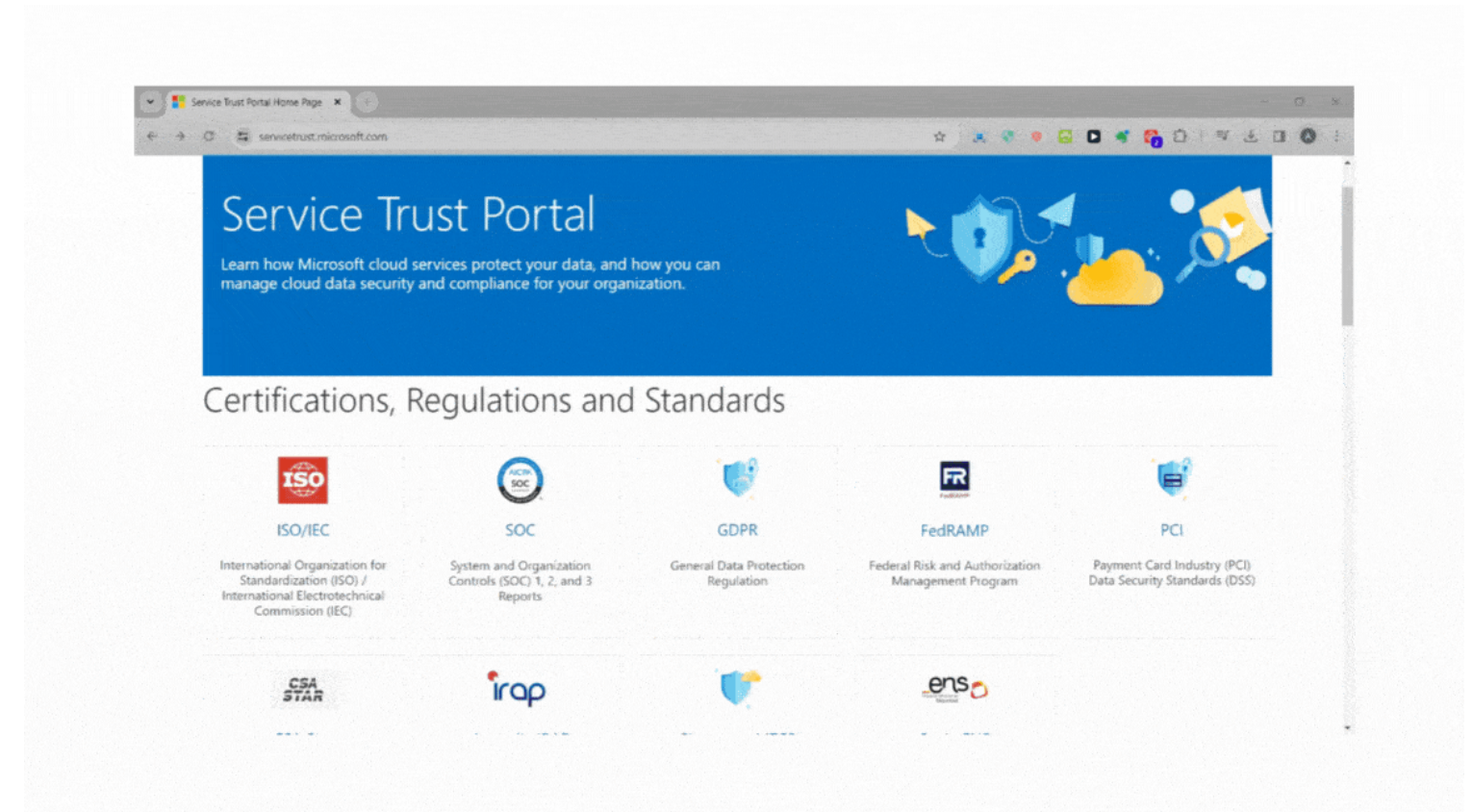


Example use case: using the Service Trust Portal

You are responsible for handling customer data subject requests (DSRs), i.e., the right to review, correct, or delete personal data, according to the GDPR (General Data Protection Regulation)

With the help of the Service Trust Portal, you can:

- look up the rules for DSRs in the GDPR
- look up documentation for how to handle such requests in Azure



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Governance and compliance tools

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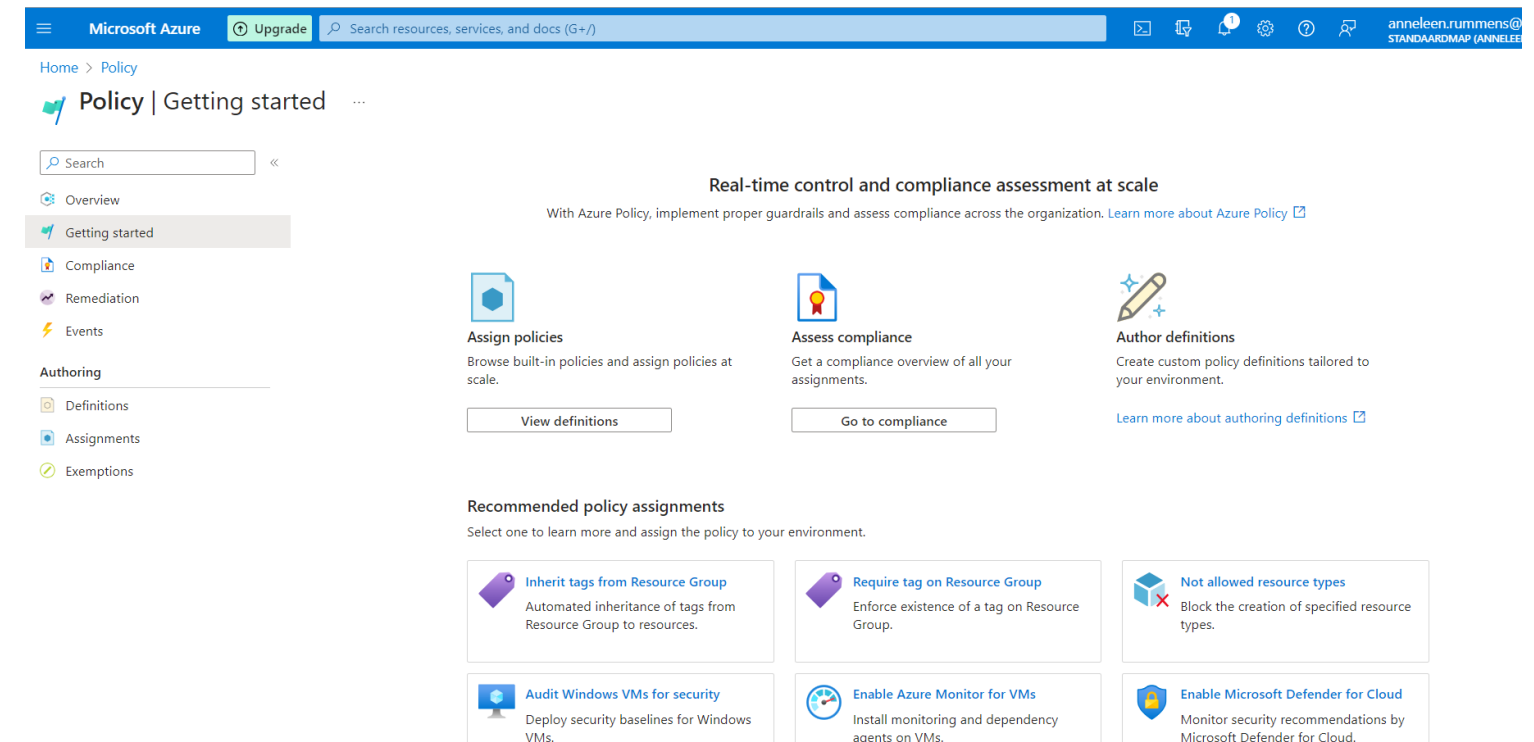
Governance and compliance tools overview

Tool	Use
Azure Policy	Enforce standards and best practices by defining and applying rules and policies to resources
Azure Blueprints	Standardize deployments, replicate configurations from existing environments

Azure Policy

Used to set rules and standards for resources

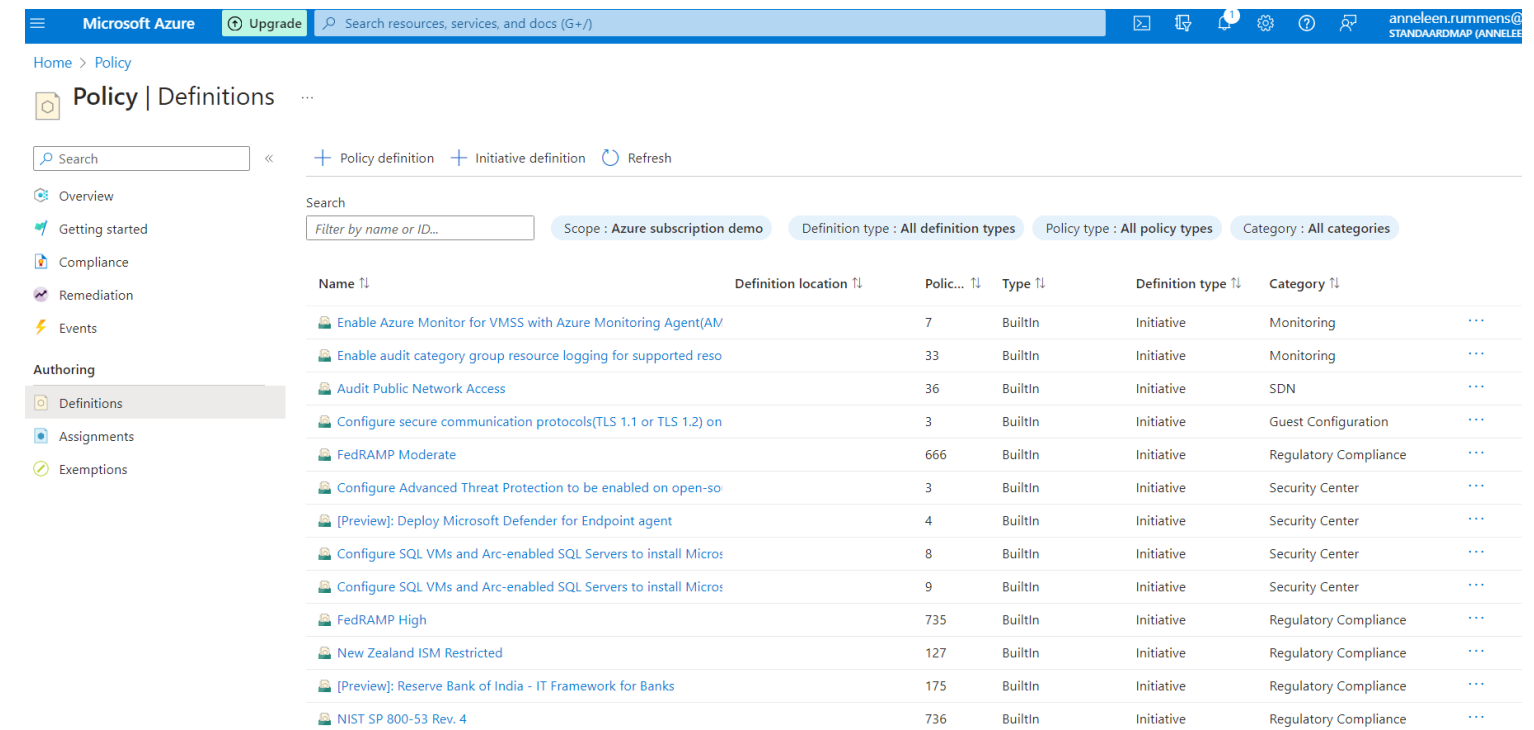
- Enforces compliance to applicable standards and regulations
- Can be set at any level and automatically be inherited by sublevels (e.g., resources take the policy of the resource group)
- Automatic remediation: e.g., applying missing tags



Azure Policy: Initiatives

Azure Policies can be grouped into Initiatives:

- Groups of related policies for a larger goal
- User-defined or built-in for common scenarios or regulations
- Example: HIPAA/HITRUST built-in initiative
 - MFA (multi-factor authentication) should be enabled
 - There should be more than one owner assigned to a subscription
 - Automatic check for missing members in the Administrators group

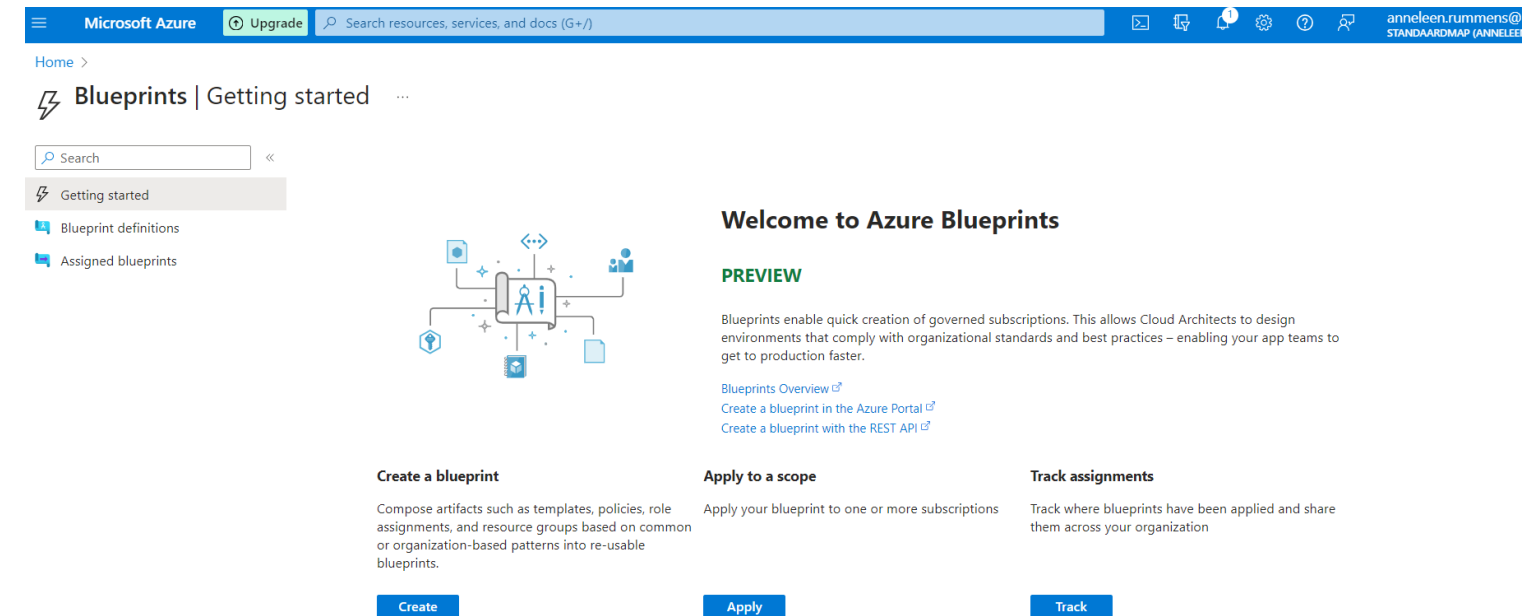


Name	Definition location	Polic...	Type	Definition type	Category
Enable Azure Monitor for VMSS with Azure Monitoring Agent(AM		7	BuiltIn	Initiative	Monitoring
Enable audit category group resource logging for supported reso		33	BuiltIn	Initiative	Monitoring
Audit Public Network Access		36	BuiltIn	Initiative	SDN
Configure secure communication protocols(TLS 1.1 or TLS 1.2) on		3	BuiltIn	Initiative	Guest Configuration
FedRAMP Moderate		666	BuiltIn	Initiative	Regulatory Compliance
Configure Advanced Threat Protection to be enabled on open-so		3	BuiltIn	Initiative	Security Center
[Preview]: Deploy Microsoft Defender for Endpoint agent		4	BuiltIn	Initiative	Security Center
Configure SQL VMs and Arc-enabled SQL Servers to install Micros		8	BuiltIn	Initiative	Security Center
Configure SQL VMs and Arc-enabled SQL Servers to install Micros		9	BuiltIn	Initiative	Security Center
FedRAMP High		735	BuiltIn	Initiative	Regulatory Compliance
New Zealand ISM Restricted		127	BuiltIn	Initiative	Regulatory Compliance
[Preview]: Reserve Bank of India - IT Framework for Banks		175	BuiltIn	Initiative	Regulatory Compliance
NIST SP 800-53 Rev. 4		736	BuiltIn	Initiative	Regulatory Compliance

Azure Blueprints

Standardize new cloud subscriptions or deployments

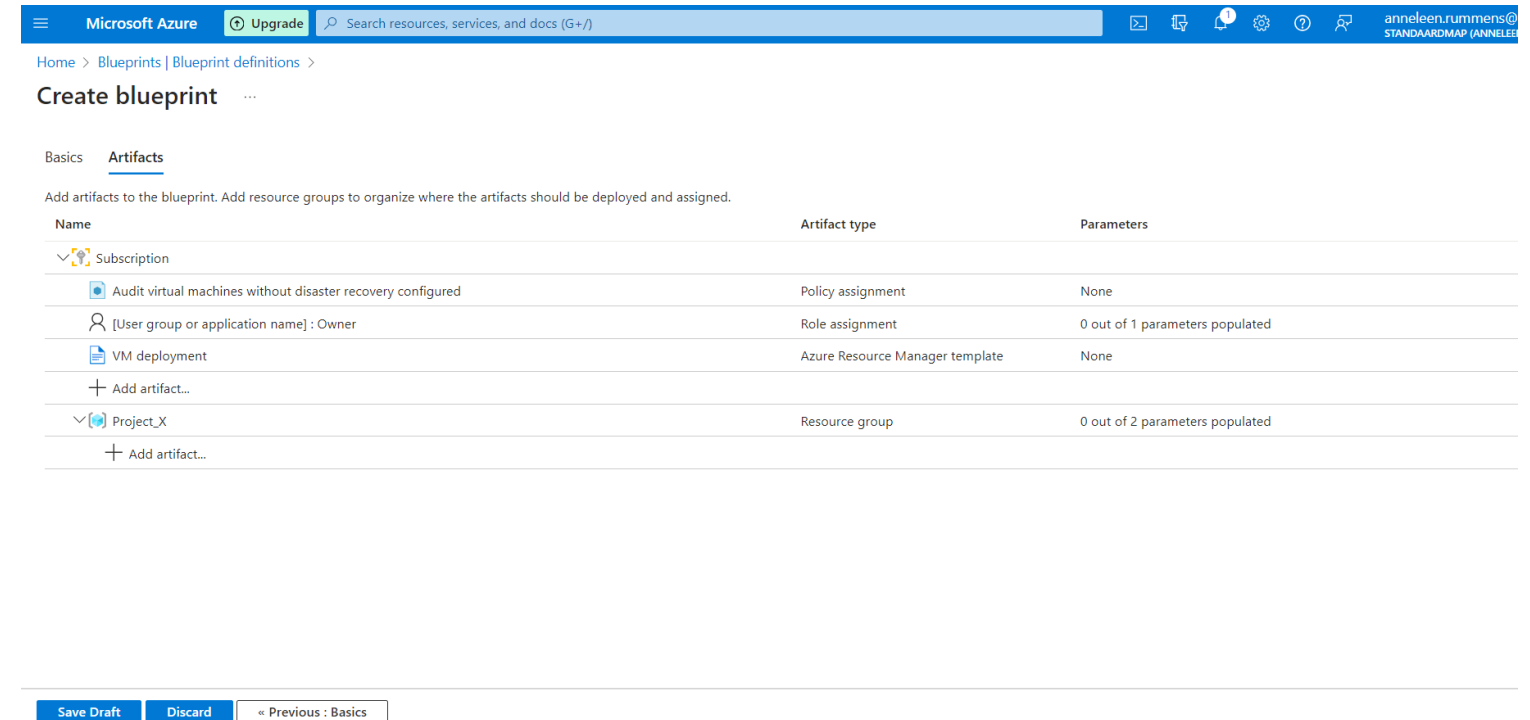
- Link between blueprint (what should be deployed) and resources (what was deployed)
- Versioning: keep track of updates or revert to a previous working version



Azure Blueprints: Artifacts

Each component of a blueprint is called an **Artifact**

- Contain parameters that can be specified
- Configuration either in blueprint or at deployment
- Examples:
 - Role assignments
 - Policy assignments
 - Resource group configuration
 - Predefined resource templates



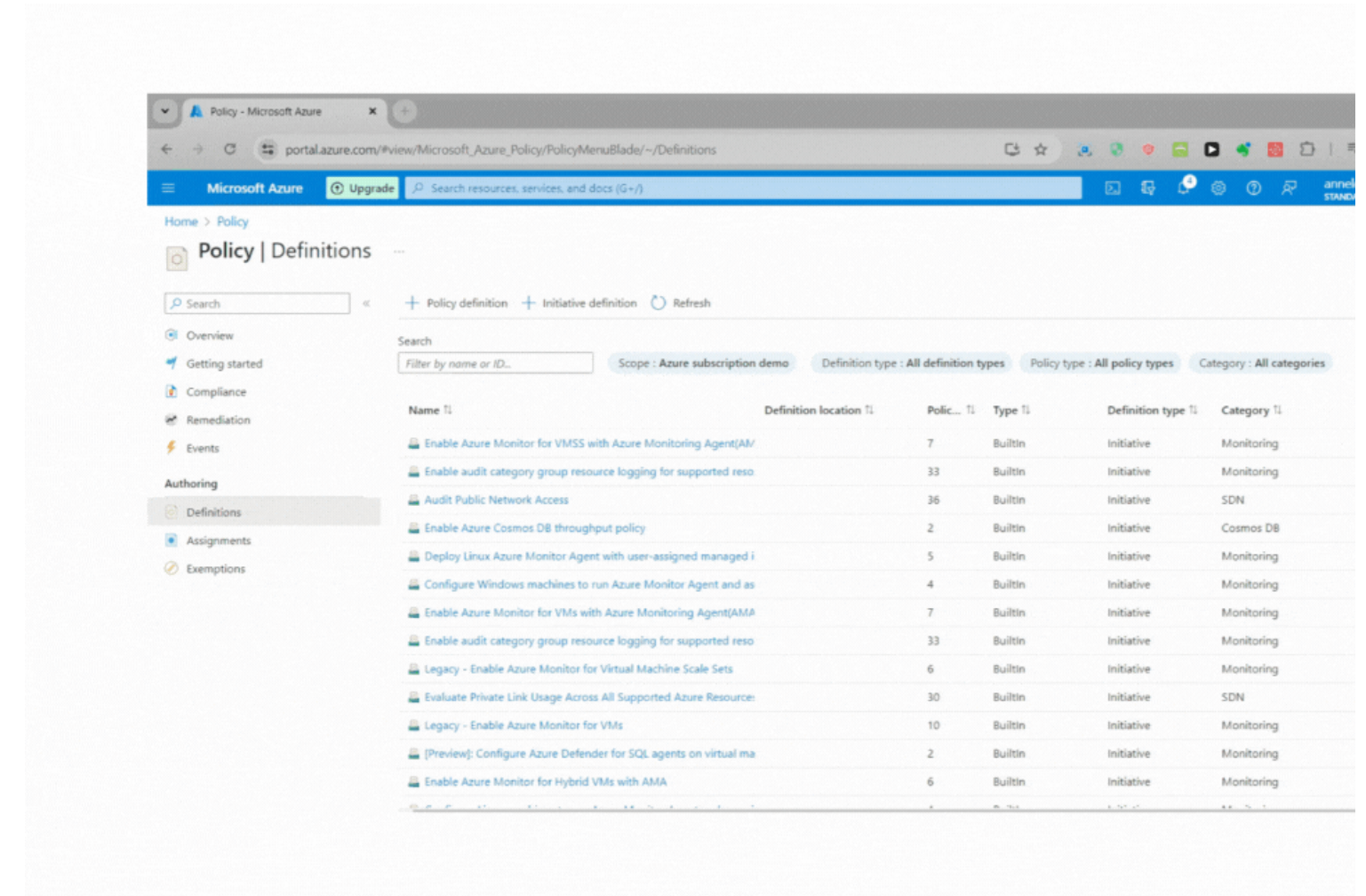
The screenshot shows the 'Create blueprint' page in the Microsoft Azure portal, specifically the 'Artifacts' tab. The page header includes the Microsoft Azure logo, an 'Upgrade' button, a search bar, and user information. The breadcrumb trail is 'Home > Blueprints | Blueprint definitions >'. The main heading is 'Create blueprint ...'. Below this, there are tabs for 'Basics' and 'Artifacts', with 'Artifacts' being the active tab. A sub-header reads: 'Add artifacts to the blueprint. Add resource groups to organize where the artifacts should be deployed and assigned.' The main content area is a table with three columns: 'Name', 'Artifact type', and 'Parameters'. The table is organized into two sections: 'Subscription' and 'Project_X'. The 'Subscription' section contains three artifacts: 'Audit virtual machines without disaster recovery configured' (Policy assignment, None), '[User group or application name] : Owner' (Role assignment, 0 out of 1 parameters populated), and 'VM deployment' (Azure Resource Manager template, None). The 'Project_X' section contains one artifact: 'Resource group' (Resource group, 0 out of 2 parameters populated). At the bottom of the table, there is a '+ Add artifact...' button. At the bottom of the page, there are three buttons: 'Save Draft', 'Discard', and '< Previous : Basics'.

Name	Artifact type	Parameters
Subscription		
Audit virtual machines without disaster recovery configured	Policy assignment	None
[User group or application name] : Owner	Role assignment	0 out of 1 parameters populated
VM deployment	Azure Resource Manager template	None
+ Add artifact...		
Project_X		
Resource group	Resource group	0 out of 2 parameters populated
+ Add artifact...		

Example use case: network security policy

You are responsible for implementing best practices for network security, such as disabling public Internet access based on specific rules

- With **Azure Policy**: implement a set of rules that blocks or restricts public Internet access
- With **Azure Blueprints**: assign above policy as an Artefact to automatically include it in new deployments



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Using the Pricing Calculator

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Anneleen Rummen
Freelance Data Scientist

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