



DECISION LENS

Technical & Security Specifications

Decision Lens Inc.
4075 Wilson Blvd, Suite 700
Arlington, VA 22203

Phone: (703) 399-2100

Copyright ©2022 Decision Lens, Inc.

Document Status and Revision History

Version	Issue Date	Revisions
V 1.28	October 5, 2022	Updated requirements, updated versioning, other updates
V 1.21	November 25, 2019	Updated versioning
V 1.19.1	February 21, 2019	Updated cover page and footer
V 1.19	October 16, 2018	Updated versioning
V 1.18	June 14, 2018	Updated versioning, removed old sections
V 1.16	Jan 4, 2018	Updated requirements, updated versioning
V 1.14	May 5, 2017	Added ElasticSearch service, updated versioning
V 1.10	April 15, 2015	Updated for DL 1.10. Updated doc versioning to match product version.
V 1.3	November 2, 2015	Updated for DL 1.8
V 1.2	July 30, 2015	Updated for DL 1.7
V 1.1	October 16, 2014	Removed optional screen sharing component. Updated server requirements to Java 1.7.
V 1.0	March 20, 2014	

Table of Contents

Document Status and Revision History	2
Table of Contents.....	3
Introduction.....	4
About This Document	4
Decision Lens Algorithms.....	5
Analytic Hierarchy Process (AHP)	5
Ratings	5
Alignment	6
Genetic Algorithm.....	6
Decision Lens – Technical Specifications	8
Client Usage.....	8
Desktop Requirements	8
Mobile Requirements	8
File Formats	8
Web Service API.....	8
Application Architecture.....	9
Cloud Hosting Infrastructure	9
Application Security.....	9
Authentication	9
Authorization	10
Data Transmission	10
Hosting Infrastructure Security.....	11
Backup and Disaster Recovery.....	11
Application and Infrastructure Patching.....	11
Technical Services.....	11
Appendix A.....	13
Amazon Web Services Documentation	13
AWS Security Compliance.....	13
Other AWS Documentation	13

Introduction

Decision Lens is a cloud-based portfolio prioritization and resource optimization software company that provides a solution to organizations' critical decision-making in R&D, capital planning, IT portfolio planning, and budget allocation. Decision Lens combines experts' judgments with data to establish priorities in an efficient, collaborative framework. Unlike static spreadsheets and unstructured boardroom table discussions, Decision Lens rapidly engages decision-makers to achieve better outcomes in a resource-constrained environment. Driven by sophisticated analytics, the software allows organizations to identify and prioritize criteria that tie directly to its strategic goals.

Decision Lens works with leading organizations to bring structure and quality to the strategic prioritization of portfolios. Our comprehensive solutions manage the strategic alignment of goals, priorities, and investments. For each customer, professional services and online training resources are available to ensure a successful onboarding, implementation and realization of ongoing value from the Decision Lens Software. The result is a more accurate, repeatable, and transparent process for portfolio decision making, even when the drivers and considerations are subjective and intangible.

Decision Lens Inc. is headquartered in Arlington, VA, and provides web-based software solutions designed to support group decision-making for planning, financial, IT and performance related decisions. By combining advanced decision-making techniques with world-class performance visualization capabilities, Decision Lens supports dynamic portfolio decision-making based on a well-structured, rational framework.

About This Document

This document summarizes technical information about the Decision Lens platform, including client hardware and software requirements, hosting infrastructure, and security. As Decision Lens improves the function, performance, and security of the Decision Lens platform, the information in this document is subject to change. This document will be revised as necessary to reflect such changes.

Decision Lens Algorithms

Analytic Hierarchy Process (AHP)

Decision-makers compare the relative importance of elements in a pairwise fashion, each one to each other one. These judgments are entered into a matrix of pairwise comparisons, where each entry of the matrix is a ratio of the relative importance of the row element to the column element.

The calculations under which AHP operates then derive the priorities for all of the elements, with some allowance for inevitable inconsistency.

If every judgment is consistent with every other judgment, it is easy to calculate the priorities for each element by simply adding across each row and normalizing. This vector of priorities is called the “Eigenvector”.

However, most judgments will have a certain amount of inconsistency. The way to deal with this is to raise the matrix to powers until the priorities implied by adding across each row converge. The Decision Lens methodology raises the matrix to the 32nd power, which is sufficient to create a convergence of priorities. We then add across each row and normalize as before.

To calculate the inconsistency of the matrix, we first add down each column of the matrix, then multiply each element of that by the corresponding element of the priority vector gained from raising the matrix to powers, then finally sum those values. If we call the result y , the consistent ratio is then:

$(y - \text{\#elements in matrix}) / (\text{\#elements in matrix} - 1)$.

Ratings

Decision Lens ratings scores for the alternatives are acquired by multiplying scores on individual criteria by the weights assigned to those criteria, and then summing the total. Ratings on individual criteria are placed on a 0 to 1 scale by using rating scales. In a verbal scale, a given verbal rating corresponds to a score between 0 and 1; that numeric score then enters the calculation. With a numeric scale, a portfolio owner can input a numeric value and define the curve of corresponding scores between 0 and 1 as desired; for a given input, the score will be based on the defined relationship of those pairs. For example, consider a scale in which a score of 50 receives a 0 and a score of 100 receives a 1. To determine which DL score to assign to a 75, find 75 on the line between the points (50,0) and (100,1). That occurs at (75, 0.5), so the DL score is 0.5.

For the overall score calculation, consider a simple example. Suppose there are 3 criteria, with weights of 50%, 30%, and 20% respectively. An alternative receives grades that correspond on the 0-1 scale to 1, 0.25, and 0.5 respectively. Therefore, this alternative’s total score will be $.50*1 + .30*.25 + .20*.5$, or .675. A score cannot be higher than 1 or lower than 0.

Alignment

When multiple participants vote on an alternative with respect to a criterion it is natural to ask how much the users agree on that vote. In other words, how well aligned are those participants on that particular vote? We need an Alignment measurement, whose score is 100% if the participants completely agreed, and is 0% if the participants were as far apart as possible. Such an Alignment measurement would allow us to answer the question “how much do the participants agree”.

Alignment = 100 – Misalignment. When we say “Misalignment”, it is similar to the concept of Variance. That is, Misalignment measures how far away the voters are from the average.

The Misalignment score of participants on an alternative with respect to a criterion is constructed using the following steps.

1. We calculate the Standard Variance of the ratings values for the participants on this vote.
2. This variance is number between 0.0 and 0.5 for any ratings system. However we need a number between 0% and 100% that has the properties outlined in Table 1. So we do the following to convert them.
3. We need to understand what constitutes High, Medium, and Low Variance in order to do this conversion to a number between 0% and 100%. However, what constitutes High, Medium, and Low Variance depends upon the number of participants and the number rating scales. We created a formula that correctly interprets a Variance as High, Medium, or Low based upon the number of participants and the number of scales.
4. We use this knowledge to then convert our Variance score into: (a) A number between 0% and 33% if that Variance was in the Low range. (b) A number between 34% and 66% if the Variance was in the Medium range. (c) A number between 67% and 100% if the Variance was in the High range.

Once the alignment score is calculated, we can make inferences with regard to the ratings data:

1. If the participants completely agree on an alternative with respect to a criterion, the Alignment is 100%.
2. If the participants disagree as much as possible on an alternative with respect to a criterion, the Alignment is 0%.
3. If the Alignment is between 67% and 100%, then the participants are Highly aligned.
4. If the Alignment is between 34% and 66%, then the participants are Moderately aligned.
5. If the Alignment is between 0% and 33%, then the participants have Low alignment.

Genetic Algorithm

The optimization solution in Decision Lens has to account for the following challenges:

- Multiple alternatives requesting resources,

Decision Lens Technical & Security Specifications

- Over multiple time periods,
- Where each alternative has the capability to “float” or move between time periods (the “sequencing”),
- Constrained by limiting factors such as:
 - Forced selection in specific time periods,
 - Logical dependencies,
 - Multiple types and pools of resources,
 - Matching rules between resource pools, and
 - Requirements to fully resource alternatives

For simple cases involving only one time period or not very many alternatives, a simple linear programming solution could be sufficient to find the optimal resource allocation. Linear programming on a larger scale is too slow to be useful - a portfolio involving 100 alternatives with funding over 5 years that allows alternatives to “float” between time periods can take hours to solve. Portfolios with 1000 alternatives take days, or even weeks.

The Genetic Algorithm (GA) solves this by mimicking evolutionary processes to create and evolve populations of solutions to find the best answer in a very short amount of time. Our GA has Chromosomes, Evolution, Fitness, Initial Population, and finally Termination that represents the best output.

Benefit-Cost Ratio: The simplest assessment of value that goes into the optimizer’s calculations is the Cost-Benefit Ratio, which is the alternative’s priority score divided into its cost. A higher benefit-cost ratio in general means that a project should have better “bang for the buck” and be more likely to be funded under an optimization scenario.

Decision Lens – Technical Specifications

Client Usage

The Decision Lens user interface is accessed via a user's desktop or mobile web browser. The Decision Lens web service API may be accessed directly by any REST capable software client provided the proper authentication credentials.

Desktop Requirements

- Operating System: Microsoft Windows 7 or later, Mac OS 10.5 or later
- Web Browser: Chrome (latest version), Firefox (latest version), Microsoft Edge (latest version)
- High speed Internet connectivity
- Allow for HTTP and HTTPS web traffic over ports 80 and 443

Mobile Requirements

iPhone:

- Operating System: iOS 8.x or later
- Browser: Safari Mobile 8.x or later; Chrome Mobile 48 or later

Android:

- Operating System: Android 4.4x or later
- Browser: Chrome Mobile 48 or later

File Formats

Decision Lens provides decision portfolio import, export, and reporting functionality that utilizes various file formats.

- Decision portfolio import: Decision Lens can import decision portfolios in the XML-based Decision Lens model format (.cmf) and JSON-based Decision Lens portfolio format (.pod).
- Decision model export: Decision Lens can export decision portfolios in the XML-based Decision Lens model format (.cmf) and JSON-based Decision Lens portfolio format (.pod).
- Data import: Decision Lens can import data into decision portfolios from Excel spreadsheets (.xlsx).
- Reporting: Decision Lens can export decision data reports as Excel spreadsheets (.xlsx), PDF (.pdf), and image files (.jpg and .png).

Web Service API

Decision Lens provides services to deliver all product functionality and data access via a web service API. All web services are available in REST (JSON) and provide full authentication and authorization functionality. The web service API may be used to create and update data, perform calculations, output results to external systems, etc. All Decision Lens user interfaces communicate with the web service API to provide the full application functionality and experience.

Application Architecture

Decision Lens exposes our decision technology via a web service API and provides user interfaces for delivering the decision process within a rich user experience.

The user interfaces consist of standard web technologies, such as HTML, Javascript, CSS, and Flash. The user interfaces communicate with the web service API over the Internet to provide functionality to the end user.

The web service API, and other related services, are implemented as Java web applications. These applications are deployed in Tomcat Application Server and are exposed to the Internet through an Apache HTTP Server proxy. The proxy enforces authentication and authorization logic for all web services based on user roles and data ownership rules.

All application data is stored in a MySQL database. Application data is only accessible to web service API code and Decision Lens administrators via a secure, private network. All customer data is logically separated for data integrity and security.

Cloud Hosting Infrastructure

Decision Lens utilizes Amazon Web Services IaaS* to provide a stable, reliable, scalable, and secure cloud-based SaaS platform. The multi-tenant architecture of the platform allows for customer organizations to get up and running with Decision Lens quickly and easily.

User identities are stored and managed within Decision Lens. Decision Lens may also be integrated with an external identity provider via SAML.

Decision Lens' cloud infrastructure is FedRAMP Moderate (NIST 800-53 Rev. 4) compliant.

*See Appendix A for technical documentation regarding Amazon Web Services.

Application Security

Decision Lens employs numerous security best practices to protect customer data and ensure application availability. Decision Lens' cloud infrastructure is FedRAMP Moderate (NIST 800-53 Rev. 4) compliant. Contact Decision Lens to request a more in-depth security whitepaper.

Authentication

Whether accessing the application through a user interface, or by making requests directly to the web service API, Decision Lens requires authentication credentials to perform all application functionality. Authentication credentials consist of a user name and password, and optional two-factor authentication is available. Configurable password creation rules require minimum password lengths and complexity (alphanumeric, symbols, capitalization). All passwords are hashed with the SHA-2 algorithm before being stored in the application database.

Decision Lens' internal identity management system and authentication mechanism can be replaced through custom integration with a customer-provided external identity management system via SAML. Please see the Professional Services section for more information.

Authorization

Access to all Decision Lens application data is controlled through authorization logic based on user roles. All customer data is logically separated from other customers, ensuring the security of sensitive data. User roles can be assigned at the application (system) level, and also at the individual decision level.

Application (System) Level Roles in Decision Lens Classic

- Group Admin: create/edit/delete user accounts, assign application level roles to users, create and participate in decision portfolios
- Portfolio Creator: create decision portfolios, participate in decision portfolios
- Participant: participate in decision portfolios only

Decision Level Roles in Decision Lens Classic

- Owner: create/edit/delete all decision data, export/copy/delete decision portfolio, input participant data (votes, comments) on behalf of all decision participants, does not participate in decision process as a voter
- Voting Owner: same permissions as Owner, but also participates in the decision process as a voter
- Voter: submits votes and comments during the decision process, cannot modify other decision data
- Reviewer: may independently review all decision data in read-only mode.
- Voting Reviewer: same permissions as Reviewer, but also participates in the decision process as a voter

Portfolio Level Roles in Decision Lens Accelerate

- Owner: Owners within the Baseline Plan can manage all portfolio data including field management, project data management, budget and cost data management, user management within the Baseline Plan and can also edit the portfolios name or archive it.
- Participant: Participants can be given permissions to edit specific fields or projects within a plan but cannot edit the field structure or add or remove fields from the portfolio. Participants can view all non-draft projects within the portfolio. This is the default portfolio role when adding a new user.
- Contributor: Primarily added through the Idea Engine. Field permissions are inherited through the Idea Engine form and can only view and edit projects they have been added to. View is restricted to the Contributors Projects Table.

Data Transmission

All data transmitted between the Decision Lens user interface (or other web service client) and the web service API is secured using Secure Sockets Layer (SSL).

Hosting Infrastructure Security

All cloud infrastructure resources are protected from unauthorized access via a number of security measures.

- Web, application, and database resources are all protected by firewall rules, restricting remote access to appropriate infrastructure clients only. The database tier is accessible via the application tier only, and the application tier is accessible via the web tier only.
- The load-balancing tier is deployed across multiple VPC subnets attached to Internet gateways for public accessibility through restricted server ports (80 and 443).
- Privileged access to the hosting infrastructure requires multi-factor authentication with a private VPN accessible only from Decision Lens' private network, a private cryptographic key, and is secured via SSH. Only Decision Lens administrators have accounts on the VPN and access to the private keys.
- The application tier is deployed across multiple private VPC subnets (no Internet gateway), restricting access to web servers only. Application server access requires a private key.
- The database tier is deployed across multiple private VPC subnets (no Internet gateway), restricting access to application servers only. Database access requires authentication credentials.

Backup and Disaster Recovery

All Decision Lens web, application, and database servers are deployed in server clusters distributed across multiple physical data centers for scalability and redundancy. All customer data is backed up multiple times per day to a geographically distant, secure storage location.

All database backups ("data at rest") are encrypted with asymmetric key pairs utilizing the RSA 4096 bit cryptosystem.

Application and Infrastructure Patching

Decision Lens has dedicated administrators who monitor Decision Lens server resources and are automatically alerted of any resource problems or operating system, firewall or application updates. All security updates are applied to Decision Lens servers on a regular basis as made available by the vendor. Non-critical patches are not applied before they are thoroughly tested by Decision Lens. Critical application bugs are fixed and deployed within 48 hours through Decision Lens' emergency change request process. All other bugs are addressed during regular product release cycles.

Technical Services

Technical Services are available at additional cost to support custom needs regarding the deployment and utilization of Decision Lens within an organization's environment. Typical Technical Services efforts include:

- Single Sign-On (SSO). Decision Lens may be integrated with SAML2 enabled external identity providers to provide SSO. Such integrations allow a customer to utilize their existing identity management systems to control user authentication and authorization within the application. SSO solutions also provide ease of access to the application for end users.

Decision Lens Technical & Security Specifications

- Data Integration. Decision Lens' web service API allows for powerful custom data integrations. Such integrations can allow a customer to automatically push data from an existing data source into Decision Lens decision portfolios or import decision results from Decision Lens to an external system for additional analysis or reporting.

Technical Services agreements typically include an initial implementation cost and annually recurring maintenance costs. Please contact your Decision Lens sales representative for more information.

Appendix A

Amazon Web Services Documentation

Decision Lens utilizes the following Amazon Web Services for all Decision Lens hosting:

- EC2 <http://aws.amazon.com/ec2/>
- Route 53 <http://aws.amazon.com/route53/>
- VPC <http://aws.amazon.com/vpc/>
- S3 <http://aws.amazon.com/s3/>
- EBS <http://aws.amazon.com/ebs/>
- RDS <http://aws.amazon.com/rds/>
- CloudWatch <http://aws.amazon.com/cloudwatch/>
- SNS <http://aws.amazon.com/sns/>
- ElastiCache <http://aws.amazon.com/elasticache/>
- OpenSearch <https://aws.amazon.com/opensearch-service/>

This document will be updated as Decision Lens utilizes other AWS services for Decision Lens hosting.

Unless otherwise requested, Decision Lens utilizes only AWS's Gov-East Region for Decision Lens hosting. More information regarding AWS Regions and Availability Zones may be found here: <http://aws.amazon.com/about-aws/globalinfrastructure/>

AWS Security Compliance

The Amazon Web Services cloud infrastructure has been designed and managed in alignment with regulations, standards, and best practices, including:

- SOC 1 / SSAE 16 / ISAE 3402 (formerly SAS70)
- SOC 2
- SOC 3
- FIPS
- FedRAMP

More information regarding AWS Compliance may be found here: <http://aws.amazon.com/compliance/>

Other AWS Documentation

- AWS Acceptable Use Policy <http://aws.amazon.com/aup/>
- AWS Customer Agreement <http://aws.amazon.com/agreement/>
- AWS Service Terms <http://aws.amazon.com/serviceterms/>
- AWS Privacy Policy <http://aws.amazon.com/privacy/>