



Sustainable Enterprise Architecture

Summary

This R&D project was developed by Viega, LeanIX, and PwC working in collaboration and provides chief information officers (CIOs) with guidance on developing an approach to sustainable IT to address their companies' "twin transition" and tackle the challenges of environmental, social and governance (ESG) transformations as well as digital transformation.



Twin Transition definition (World Economic Forum):

"bringing the digital and sustainability agendas together to improve digital function, drive sustainability goals and future-proof their organisations."

This paper also provides CIOs and technology leaders with an overview and descriptions of the principal issues and key performance indicators (KPIs) that need to be included in any sustainable IT approach, along with suggestions on how to prioritize these KPIs based on the work done with Viega. With these KPIs and objectives in place, enterprise architects can ensure that the necessary operational changes take place.

Given the rapid proliferation of relevant technology, Viega, LeanIX and PwC joined forces on a research and development project aimed at demonstrating how Enterprise Architecture (EA) can help organisations achieve their ESG goals. A set of best practices was developed using LeanIX Enterprise Architecture Management (EAM) software and data provided by Viega, the customer. Viega is a leading supplier in the installation technology sector with clients in building and industrial plant construction, shipbuilding and the utility sector. These best practices serve as guidelines allowing organisations to approach both IT and Enterprise Architecture with an ESG mindset. Through this project, LeanIX proved the value of EA in supporting organisations with sustainable IT transformations, from strategic ideation to operational execution. As a result, LeanIX functionality can be easily adapted to help IT leaders address ESG.

Agenda

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- 2 Three partners – one collaboration project

- 3 Project approach



1

Why sustainable IT

The world is facing multiple global emergencies. From the outbreak of the Covid pandemic to geopolitical uncertainties and climate change, companies' resilience is in a state of permanent risk. Pressure on companies is also on the rise as investors, consumers and employees increasingly prefer companies that address sustainability issues seriously.

According to the latest Intergovernmental Panel on Climate Change (IPCC, March 2023)¹ report, human-caused climate change has already led to extreme weather in every region around the world. The consequences have been devastating, causing widespread damage and loss to both people and nature. The earth's temperature has already risen by 1.1°C and if current climate policies persist, global warming will increase to 3.2°C by 2100. To keep within the 1.5°C limit, emissions need to be reduced by at least 43% by 2030 compared to 2019 levels, and at least 60% by 2035. Since companies around the world account for the highest volume of CO₂ emissions, they likewise have a crucial role to play in hitting these emission targets.

In addition to addressing these environmental issues, companies are now also increasingly required to act in a socially responsible manner more broadly with regard to the communities and customers they serve as well as their suppliers, partners, and employees. This means that companies must look beyond climate change to also tackle instances of inequality and wealth disparity wherever they operate.

The need for companies to behave more sustainably and responsibly places a special emphasis on corporate governance. Determining whether or not a company is meeting its goals or complying with relevant standards requires wide-ranging knowledge of the current and target status of in-house operations and their internal and external effects. Moreover, governance also ensures that, in pursuit of these initiatives, companies maintain an ethical corporate culture and management approach. As it turns out, ESG efforts are no longer a "nice to have" but are in fact becoming mandatory for companies with the extension of EU legislation such as the EU Taxonomy or the Corporate Sustainability Reporting Directive (CSRD).

This also means that integrating ESG into all business activities is essential to maintaining a company's viability. Companies need to find new ways to step up to the challenge and create business models which are not only ecological but efficient and equitable. **In this context, twin transition makes sense as enterprises are required to adopt a systemic approach to aligning their interests with those of their stakeholders and with the interests of society more broadly. Combining the digital and the sustainable IT transformation is the best way to achieve this alignment.**

As digitalisation continues to accelerate, IT plays a crucial role in enabling companies to develop new business models and optimize their technology investment. The CIO must take an active role in advancing technology-based sustainability strategies and technology-enabled business processes in order to achieve corporate goals in the areas of environment, social affairs, and governance. Consolidating digital transformation efforts with efforts to understand, monitor, and improve sustainability makes more and more sense as business strategy and sustainability strategy converge. Frankly, the ability to think ESG and IT together enables truly impactful ESG initiatives that, after all, require a close collaboration between IT and other business functions.

Given the need for this close collaboration, CIOs should look to EAM for help developing a sustainable IT strategy. EAM provides crucial insights into an organisation's IT landscape at varying scales, from individual business capabilities to the entire value chain. In fact, it's difficult to imagine how one would proceed without EAM. For any company to achieve its ESG vision, it must analyse and transform its current operating model at every level. This model is implemented through – and sustained by – IT systems. EAM structures and focuses ESG efforts within an organisation because these efforts will only be realized through technology. The focus on business capabilities that EAM provides makes it possible for the CIO to have meaningful conversations with other business leaders that direct these capabilities to the technology that supports them. By layering ESG tracking into EAM tools and models, CIOs and their partners across the business can begin to make fully informed decisions that drive the business and the sustainability agenda simultaneously.

¹ https://report.ipcc.ch/ar6syrr/pdf/IPCC_AR6_SYR_SPM.pdf.



Three partners – one collaboration project

LeanIX, Viega and PwC came together to define a blueprint and set a starting point for a “Sustainable Enterprise Architecture” initiative. A collaborative project was set up to drive fast and feasible change relying on fact-based insights. With a capability-based approach, adapted to incorporate ESG KPIs, an R&D project was developed demonstrating how LeanIX can support Viega’s ESG transformation and orchestrate a sustainable IT strategy, unlocking their companies’ twin transition.

Viega is committed to ESG principles and has a deep understanding of the importance of sustainable development in business. The company has taken a proactive approach to integrating the UN’s Sustainable Development Goals (SDGs) into its daily operations. Based on its sector, Viega has committed to six SDGs, three of which are relevant for this project (SDG 7 – affordable and clean energy, SDG 12 – responsible consumption and production, and SDG 13 – climate action) and helped make the focus of the MVP environmental sustainability. Finally, Viega’s skilled IT team, and the company’s understanding that hitting ESG targets depends on the active involvement of IT, made them a perfect partner for this project.

LeanIX was named a Leader in the “2022 Gartner® Magic Quadrant™ for Enterprise Architecture Tools” report. By allowing companies to have a complete overview of their organisation from the business layer down to the architecture layer, LeanIX EAM provides reliable transparency into evolving IT landscapes, perfectly meeting the project’s requirements. LeanIX has become the “catalyst” of this R&D project, providing a platform for defining a sustainable IT strategy while enabling all partners to evaluate impact, track progress, and manage cross-functional collaboration.

At LeanIX, a group of employees spanning across different departments founded “GreenIX,” which looks into improving LeanIX’s environmental impact by measuring the complete CO₂ footprint and offset LeanIX travel CO₂ footprint and support employee-driven projects that lead to a more sustainable environment and organisation.



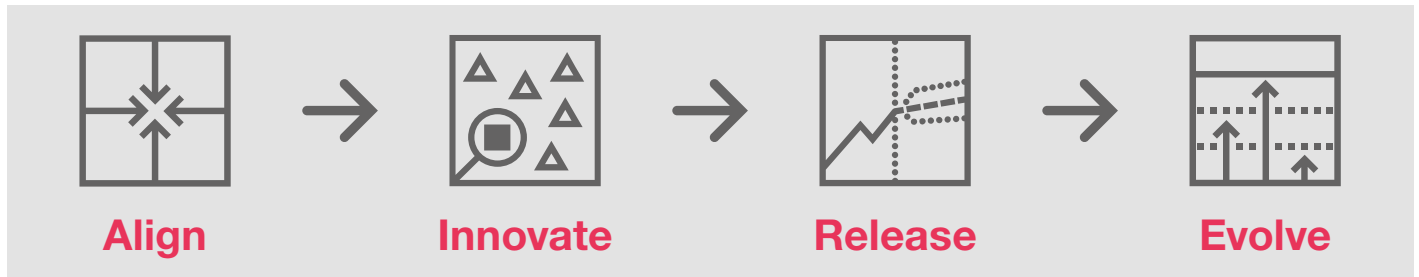
LeanIX has long been committed to promoting sustainability and has worked in close cooperation with SustainableIT.org, a non-profit organisation seeking to advance sustainability around the world through technology leadership. SustainableIT.org has developed essential standards for measuring IT’s impact on corporate sustainability that help companies set ESG targets, monitor their impact and identify opportunities for sustainable initiatives. The collaboration between LeanIX and SustainableIT.org has added value to this initiative, with SustainableIT.org’s standards being used as a data source to identify the five key metrics defined for the R&D project.

PwC’s ESG expertise provides a valuable perspective on sustainability, as they have extensive knowledge of standards and best practices as well as practical experience in implementing ESG strategies. More importantly, PwC views the twin transition as a crucial topic that emphasizes the importance of a sustainable IT strategy.

With the ESG Capability Map for IT, PwC provides an ESG framework including the 30 most important IT-related ESG capabilities. Those capabilities are required to integrate the topic of sustainability within IT holistically and provide an understanding of the needed action fields based on current regulatory requirements. Environmental sustainability includes efforts to address climate change and reduce pollution, among other measures. Failure to address environmental impact can not only lead to reputational losses but also damage the overall environment up to a point of no return. Social factors include human rights, ethical sourcing and labour practices. As an example, remote and flexible working models are increasing and there is therefore a need to ensure that employees’ rights are protected, where cloud-based collaboration and communications tools are usually involved. Lastly, enterprises need to ensure that processes are managed and run properly. Therefore, good governance includes transparency and accountability throughout the whole company.

3

Project approach



The aim of this collaboration was to co-develop an R&D project supporting Viega's sustainable IT transformation using LeanIX as a central platform for orchestration along with relevant ESG metrics developed by PwC.

To optimise resource utilisation while ensuring an effective project launch, an agile methodology was adopted with interactive workshops and sprints. Four main phases were defined over eight weeks:

1. Stakeholder requirements and goals were aligned (Align).
2. New ESG-related functions were designed (Innovate) with a focus on five main ESG metrics (energy consumption, emissions, electronic waste, digital ethics and green sourcing).
3. The development phase was then initiated to implement the metrics within LeanIX and build user journeys. This was then tested within Viega's environment (Release).
4. Finally, a backlog of further iterations was defined. Although strictly speaking these are out of scope for the R&D project, they are still valuable for the project overall and should be considered for further developments (Evolve).

→ Align

Coming from the higher capability-based perspective, the R&D project acts as a strategic-level roadmap whilst also providing a monitoring function, with relevant ESG data added to Fact Sheets (the central element in LeanIX's Data Model) on an operational level. To this end, the ESG Capability Map for IT was implemented in LeanIX by introducing a dedicated Fact Sheet Type – "ESG Capabilities" – where all this information could be stored. Each capability can be evaluated in terms of the client's intention and strategic goals, as well as in terms of the current maturity and the target maturity. By using the ESG capabilities for the definition of a strategic roadmap, individual ESG related projects can then be created and linked to the target capability. This helps clarify the implications of ESG in IT for Enterprise Architecture by showing how the architecture realizes and supports these capabilities and acting as a navigator for the development of effective sustainability-driven transformation strategies.

On the alignment front, LeanIX and Viega prioritised the environmental aspects of ESG for the R&D project.

→ Innovate

To ensure that the ESG projects within LeanIX were supported with clear data and tracking measures, relevant metrics and underlying KPIs were identified on a more operational level to provide greater insights on specific actions. During the innovation phase we selected five key metrics – **emissions**, **energy consumption**, **electronic waste**, **digital ethics**, and **green sourcing**. The process was closely linked to the ESG Capability Map for IT and was aligned with the standards of SustainableIT.org to increase the reliability of the chosen metrics.





Whereas the ICT sector was only responsible for 1% of global CO₂ emissions in 2007, this could rise to 14% by 2040.



Emissions

Global warming is putting companies at risk due to increasing extreme weather. Whereas the ICT sector was only responsible for 1% of global CO₂ emissions in 2007, this could rise to 14% by 2040.² To mitigate climate risks, it is critical that companies monitor and reduce their IT-related CO₂ emissions. As a start, CIOs should focus on the CO₂ footprint of the hardware components their companies use. Carbon footprints need to be calculated on a whole lifecycle basis, not just the use stage. This is particularly important as a large part of the emissions are generated by upstream processes in the value chain by suppliers and raw materials.

The transparency gained by taking a product carbon footprint (PCF) approach is key to identifying carbon-intensive hardware and replacing it with IT Components that ensure a lower carbon footprint over time. For that, the Hardware category of the IT Component Fact Sheet was used to track the PCF value of companies' hardware. This included, first, calculating CO₂ emissions per hardware component throughout the entire value chain and, second, throughout the usage phase. This means that end users have to search for publicly available product information with lifecycle data from hardware manufacturers and insert it into LeanIX using the IT Component Fact Sheet for the item of hardware. Additionally, LeanIX customers can embed information provided by Azure in their "Microsoft Cloud for Sustainability" in the LeanIX dashboards as an external content item allowing the seamless monitoring of IT CO₂-related cloud usage data.



Energy consumption

High energy consumption significantly impacts operating costs and leads to excessive carbon emissions. The share of global electricity consumption of the ICT sector is expected to rise to 21% in 2030 compared to 2010.³ Purchasing energy-efficient devices is one way to decrease consumption. The transformation in power generation provides another opportunity for further reducing carbon

emissions. Energy generation from green sources is becoming more widely available for many companies. Wind and solar energy in particular are becoming increasingly important. As a result, companies are investing in renewable energy plants to cover their own energy needs.

The aim of this metric is to create transparency around the share of purchased renewable energy as well as the consumption footprint of the hardware equipment used in the company. This overview makes it possible to track hardware – such as servers – that consume too much energy and could be replaced. In addition, this metric can lead to the exploration of other options such as reducing the amount of energy-consuming technology a company maintains itself. For example, servers might have a high energy requirement, making a transformation to a cloud-based system worthwhile.



Electronic waste

The increasing use of electronic devices, combined with the trend towards shorter lifecycles is leading to an increase in the number of products being discarded every year. In fact, the global amount of e-waste is predicted to grow to 74.7 million metric tons by 2030.⁴ This is quickly becoming a major environmental and health concern, as e-waste contains toxic chemicals.

Solutions to reduce e-waste are increasingly important. Implementing a circular approach such as extending the lifecycle of electronic devices can not only reduce the amount of e-waste generated, but also reduce carbon emissions due to lower production rates. It also conserves natural resources, a potential US\$57 billion industry.⁵

Adding an electronic waste field on the IT Component Fact Sheet in the hardware category in LeanIX was intended to increase the ability to record the "circularity" of devices a company uses. It compares the useful life of the device as recommended by manufacturers and the actual length of usage of the device at the company. Additional data on whether the device is recycled, donated or refurbished inside or outside of the company at the end of its useful life is also provided to emphasise the repair, re-use and longer usage cycles of devices.

² Belkhir; Elmeligi (2018), Assessing ICT global emissions footprint: Trends to 2040 & recommendations.

³ Digital Information World (2020) <https://www.digitalinformationworld.com/2020/02/the-global-energy-consumption-of-information-technologies-infographic.html>.

⁴ www.pwc.nl/en/topics/sustainability/green-deal-monitor/green-deal-monitor-8.html. btw. Forti et al. (2020), The Global E-waste Monitor 2020.

⁵ Forti et al. (2020), The Global E-waste Monitor 2020.



Digital ethics

PwC expects that the German gross domestic product will increase by more than 11% by 2030 as a result of artificial intelligence.⁶ However, there are also concerns over the profound changes AI technologies will bring about. To support the required social acceptance of those technologies, it is crucial for companies to develop their IT transformation ethically to strengthen trust in new technologies and business models. Digital ethics is all about addressing social, environmental and economic impacts when developing and using IT. Building trust in IT can be achieved by ensuring data security and privacy, developing and establishing a code of ethics, creating transparency in automated processes, using ethical design thinking methods and upskilling employees about digital ethics.

In the context of this project, the ethical focus was on ESG-compliant coding for users' self-developed applications. PwC designed four criteria for development including **ease of navigation**, **lean code**, **color-blind aspects** and **attendance of training in ethics**. By using code downsizing methods, it is possible to remove unnecessary code fragments to verify if an efficient lean code is being used.



Green sourcing

Not only is regulatory pressure on companies rising, but customer demand for sustainable products is also increasing. For IT, fulfilling environmental standards in the supply chain of hardware products is particularly relevant. Environmental destruction entails ecological risks through improper mining and disposal procedures as well as CO₂ emissions from the use of fossil fuels in mining and production processes for IT Components. Companies need to establish transparent supply chains to increase stakeholders' trust. In this context, IT needs to pay attention to compliance with ecological and social standards of the vendors they select.



Since the project scope is mostly focused on ecological aspects, Carbon Disclosure Project (CDP) was chosen to be the principal ESG auditor to evaluate the environmental impact of IT providers. CDP is a widely used and recognized standard in environmental reporting and provides a large comprehensive data set on environmental activities of companies and cities in relation to climate, forests, and water. Users can see a report of the number of IT providers using CDP for environmental disclosures and most importantly their results. As the ESG transformation is only getting started, it is clear that many IT providers may not use CDP or other ESG auditors. This is where LeanIX provides users with transparency on the current status of a company's virtual supply chain. For this R&D project CDP data was matched with the current provider FS in the Inventory. As a result, IT provider ratings are placed on the respective IT Provider Fact Sheet in LeanIX. Using inbuilt reports allows users to assess their overall IT provider portfolio and take decisions on that basis.

→ Release

The PwC ESG Capability Map implemented within LeanIX offers CIOs valuable guidance on selecting a strategic perspective and focus area for the most critical ESG initiatives in IT. The ESG Capability Map provides a comprehensive overview of ESG topics, initiatives and KPIs that CIOs can explore. CIOs can simply click on any of the capabilities to view the current maturity level, target maturity level, and strategic importance of each capability which has been previously evaluated by their CSR department.

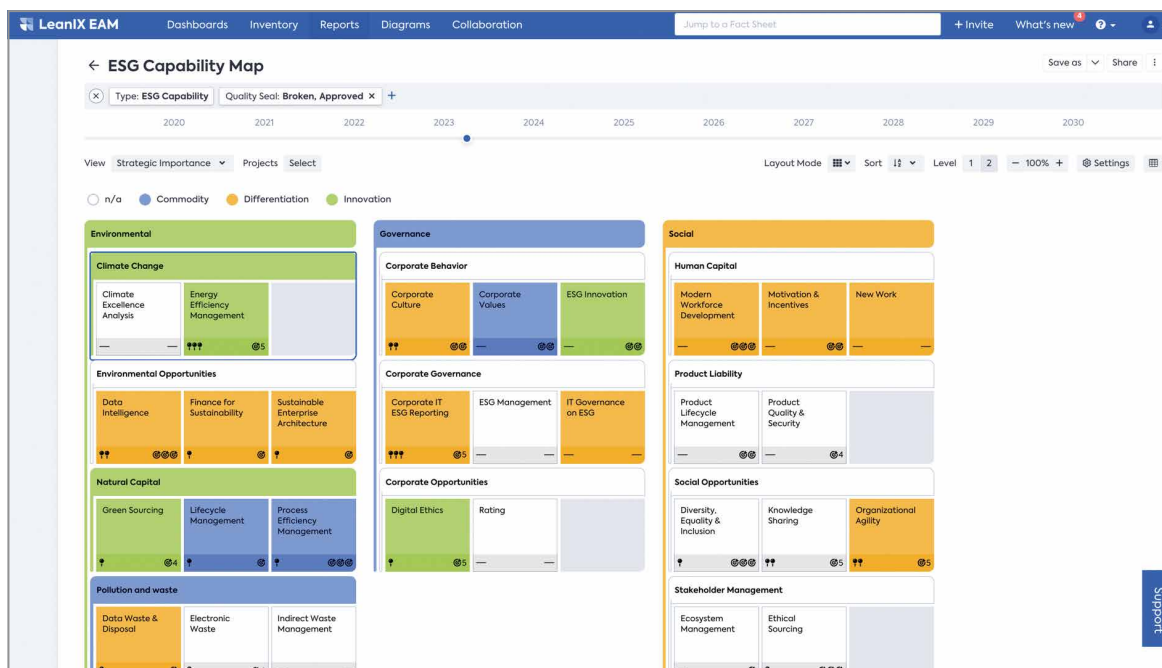
Additionally, LeanIX allows users to create projects within each ESG capability, defining their scope and description. Architectural elements involved and impacted by the project can be scoped via filter selection within the Project Fact Sheet. To collect the relevant data for the project, surveys can be used to gather information from subject matter experts and those responsible for the architectural elements, modelled via subscription roles in the Fact Sheets. Furthermore, the tool enables its users to monitor project status and progress, ensuring they remain on track towards achieving their ESG goals.

Finally, CIOs can access the custom created Sustainability Dashboard, which provides an overview of all the aggregated data from the KPIs related to sustainability and the general status of the company's ESG initiatives. This view offers valuable insights into the organisation's sustainability efforts in IT and empowers leaders to make informed decisions based on the visualised data. With the ESG Capability Map and the Sustainability Dashboard, CIOs can effectively drive their organisation's ESG agenda forward.

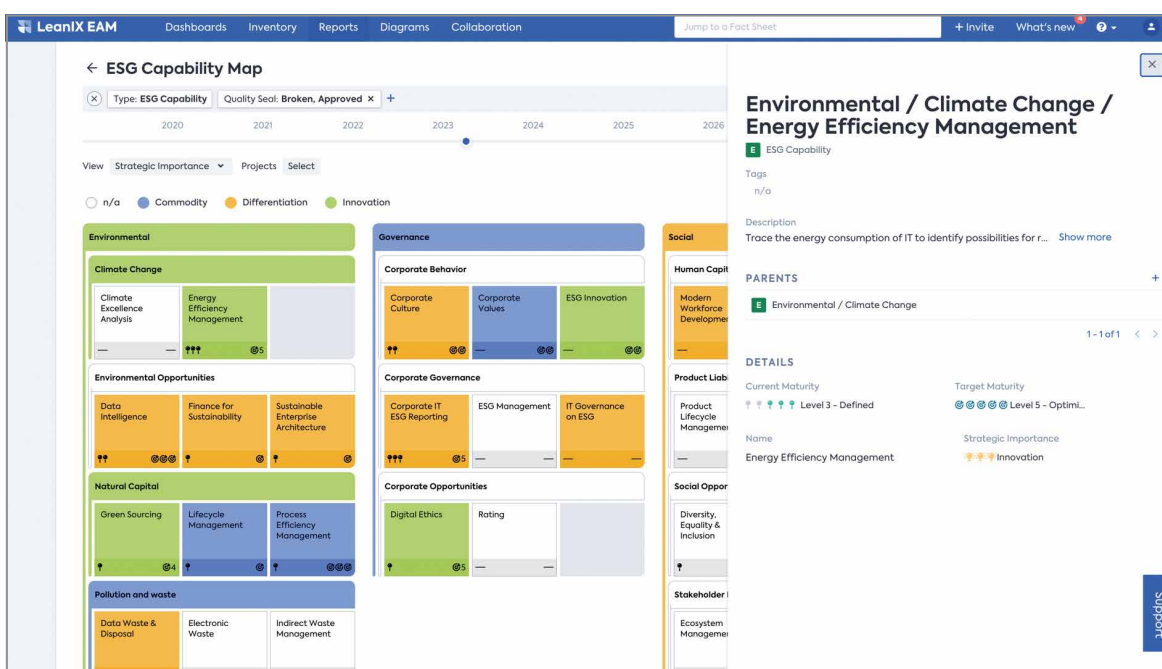
⁶ PwC (2018), Auswirkungen der Nutzung von künstlicher Intelligenz in Deutschland.

To illustrate how this works, the user journey for defining a project related to energy efficiency would look like the following:

1 Step 1: Choose a strategic perspective and an ESG topic to focus on, within the Capability Map.



2 Step 2: Define the strategic relevance of the topic. Using the ESG Capability Map, users can work together with their corporate social responsibility department (CSR) to assess the strategic importance of the capabilities and assign the appropriate maturity level to them. If further information on the capability is required, users can go directly into the capability Fact Sheet to gain a deeper understanding of it, its implications for IT, and the associated KPIs.



3

Step 3: With the big picture strategy in place and an understanding of the gaps to be filled, based on the ESG Capability Map, CIOs, EAs and CSR can define projects within the corresponding ESG capabilities and their scope (using the objectives and key results methodology).

LeanIX EAM Dashboards Inventory Reports Diagrams Collaboration Jump to a Fact Sheet + Invite What's new 4

E Energy Efficiency Management 41%

Set your role +

Fact Sheet Subscriptions Comments To-Dos Resources Transformations Metrics Surveys Last Update (less than a minute ago)

Dependencies 50%

Business Capabilities

Objectives (1)

Reduce our IT energy consumption by 10% on 2024

Projects (1)

Project *

Reduce energy consumption by 20 %

Active from 2023-03-15 Active until 2023-06-15

Description

Delete entry Cancel Save & New Save & Next Save

4

Step 4: Prepare the data model for the new information that needs to be collected, by creating your own attributes or adding attributes based on the provided best practice examples. For ESG Capabilities these could include fields for Digital Ethics, Green Sourcing, or Energy Consumption).

LeanIX EAM Dashboards Inventory Reports Diagrams Collaboration Jump to a Fact Sheet + Invite What's new 4

IBM BladeCenter HS23E 8038B3N 38% Approved

Set your role +

Fact Sheet Subscriptions Comments To-Dos Resources Transformations Metrics Surveys Last Update (less than a minute ago)

ESG Evaluation 0%

Energy Consumption

kWh consumption at this location

Is renewable energy used for this IT Component?

Please select

Links to bought renewable energy certificate

Cancel Save & Next Save

5

Step 5: Use surveys to collect data for the newly created attributes. Surveys are a simple way for Fact Sheet owners to approach subject matter experts and ask them to provide the data needed for your ESG projects.

LeanIX EAM Dashboards Inventory Reports Diagrams Collaboration Jump to a Fact Sheet + Invite What's new

Sustainability evaluation for On premise (Hardwares) components.

Norma Arrazola Herrera, you have been invited to the following Survey for the Fact Sheet Cisco Systems 12000 Series Router 12016 by Norma Arrazola Herrera.

Please provide the sustainability information for this IT Component

ESG Evaluation 89%

Energy Consumption

kWh consumption at this location

1000

Is renewable energy used for this IT Component?

Yes, renewable energy is used

Links to bought renewable energy certificate

Cancel Save & Next Save

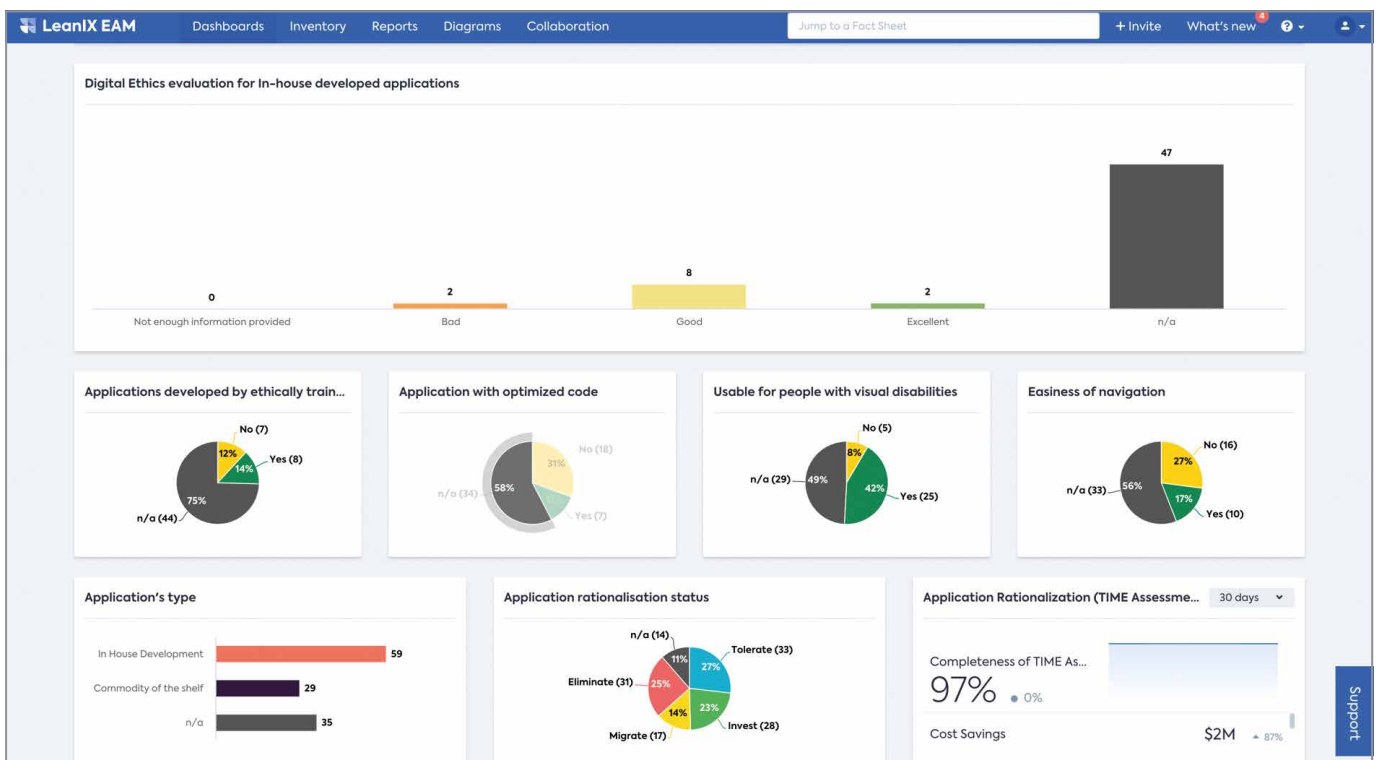
Emissions

Product carbon footprint value:	1500
Kg of Co2 embodied per device (optional):	500
Kg of Co2 per device during usage (optional):	1000

Support

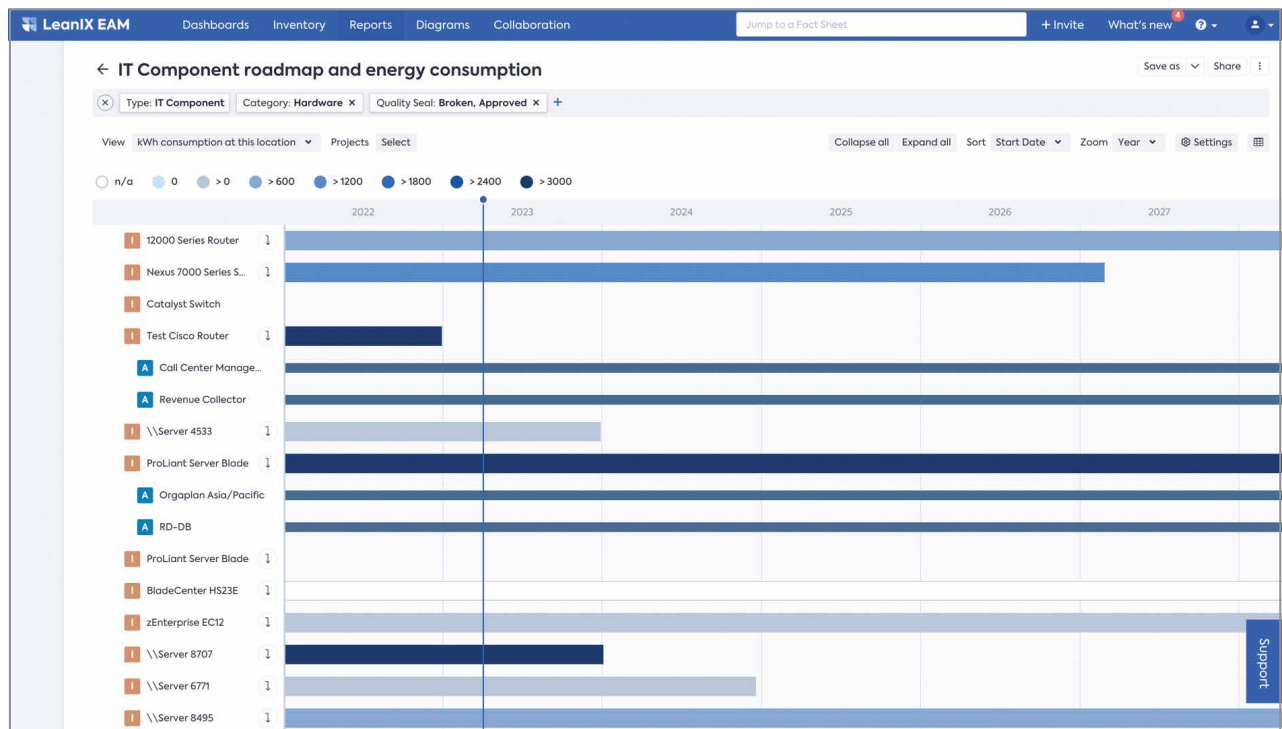
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Step 6: Monitor the progress of data collection by using the different mechanisms offered by LeanIX such as the quality seal, the survey administration area, or by creating a dashboard with the targeted fields as custom chart widgets.



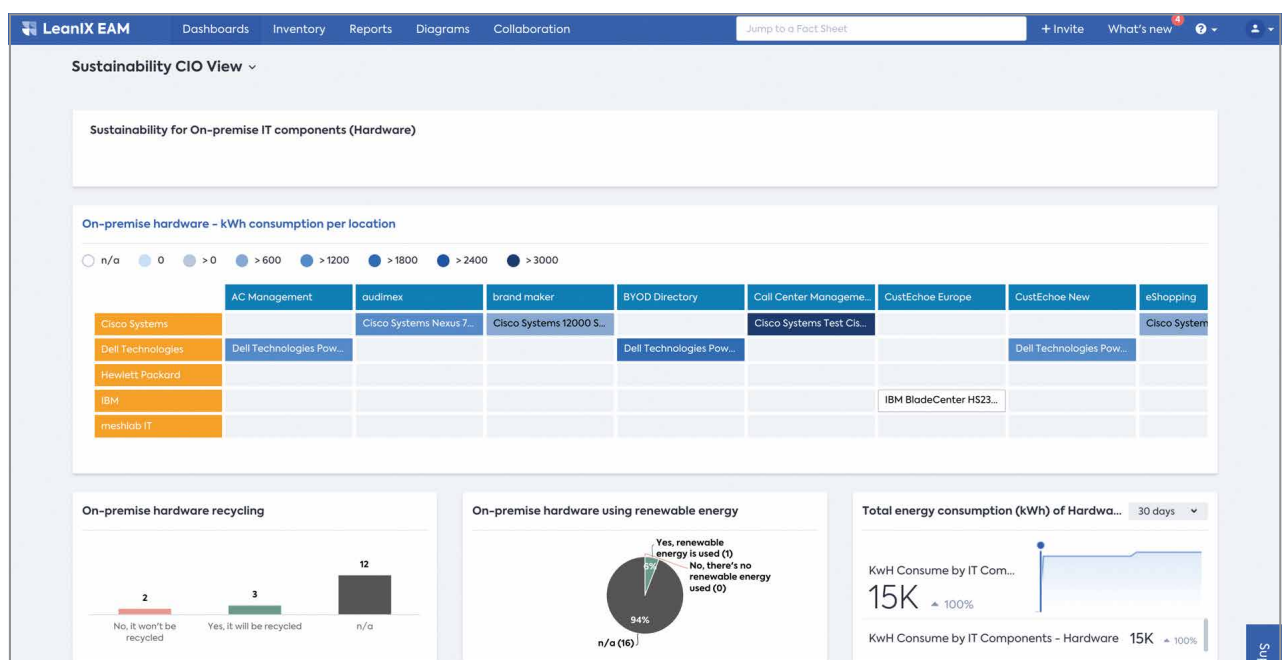
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Step 7: Once there is a substantial amount of ESG data, use the reporting capabilities of LeanIX to make data-driven decisions that will allow you to improve your current maturity of the related ESG Capabilities. With the reports, and by cross-checking the ESG data with your EA data, you can uncover areas of opportunity for ESG efforts and contextualize them within your IT and EA strategy as well as in a wider business context.



8

Step 8: Drive conversations by presenting all relevant ESG information in new dashboards you create with embedded metrics, KPIs and reports.



→ Evolve

It has been clear to all project partners from the outset that this blueprint is an innovation project, where the first step is to provide guidance and help CIOs and their enterprise architects to get started with a sustainable IT strategy.

The main challenge during the development of the R&D project was the lack of databases providing verified, comprehensive IT and ESG-related information that can be automatically entered into LeanIX via API. As a result, end users will to some extent have to rely on manual research and implementation regarding the metrics.

Tracking the environmental impact of software is still in the very early stage. Software providers do not currently provide the transparency around things like green coding, carbon footprint or energy consumption needed to assess sustainability. This continues to make measuring the environmental impact of software difficult. However, software providers and several global initiatives are launching pilot projects to track software sustainability. Companies can therefore continue to pursue the topic of sustainable software in the context of their sustainable IT transformation and can include the data in their ESG tracking if available.

The use case of digital ethics within coding can also be leveraged across IT. For example, tracking achievements in data security and privacy, upskilling training for employees and other projects on responsible use of digital technologies can be useful for driving corporate social responsibility as well as better governance.

Another option relating to the “green sourcing” metric would be to add an ethical dimension, allowing one to assess not only the provider’s environmental efforts but also their social responsibility. Relevant criteria might be compliance with human rights in the mining and production processes and impact on local communities. Hence there is great potential for collaborating with various auditors, such as Ecovadis, to integrate different ESG data and create even more transparency.

Furthermore, governance aspects could be enabled by linking corporate IT ESG activities with reporting requirements such as the Global Reporting Initiative (GRI) standards published by the Task Force on Climate-related Financial Disclosures (TCFD) or SDGs, which can be integrated as regulatory requirements for sustainability reporting increase. A linking function can be valuable for companies as it allows them to complete their sustainability reporting in a more structured and efficient way.

While there are many opportunities yet to emerge, one thing is clear: Enterprise Architecture Management is crucial for a sustainable IT strategy, where an ESG transformation in IT is a starting point. Enterprise Architecture Management guides IT landscape development and links technology with business activities. It not only helps clarify strategic issues but also provides full visibility down to a granular level of IT artefacts and components. When applied to valuable ESG use cases, Enterprise Architecture Management can support a range of ESG goals. As this brief has highlighted, LeanIX brings this support to the entire sustainability journey.



Contacts



Silke Schelkmann

Partner
CIO Advisory
PwC Germany
silke.schelkmann@pwc.com



Estelle Places

Manager
CIO Advisory
PwC Germany
estelle.places@pwc.com



Marina Schneider

Senior Associate
CIO Advisory
PwC Germany
marina.s.schneider@pwc.com



Marius Scheidt

Senior Associate
CIO Advisory
PwC Germany
marius.scheidt@pwc.com



Norma Arrazola Herrera

Consultant
LeanIX GmbH
norma.arrazola@leanix.net

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