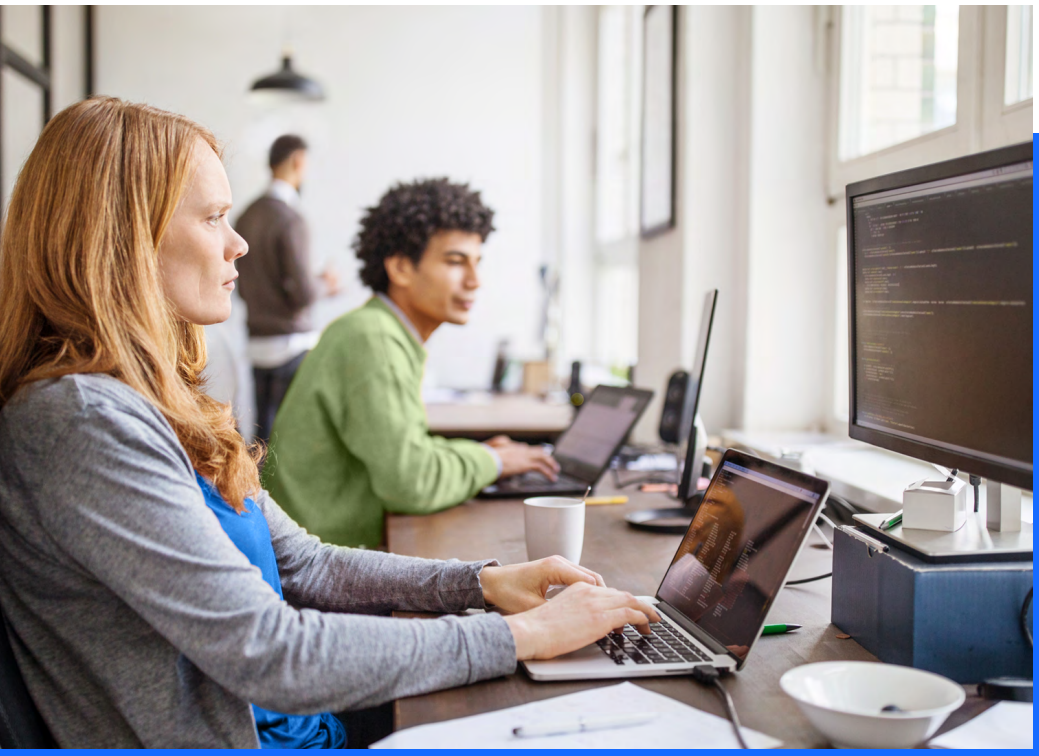
WHITE PAPER

Brownfield to Future:
Four Steps to Make Your Digital Production Platform a Success

How heterogeneous brownfields jeopardize competitiveness — and why Digital Production Platforms are often not helping.



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CONTENT

Imagine a company that's been manufacturing engineering marvels for the better part of a century. Each new product rolled out of its plants is sleeker, faster, and more efficient than the one before. Their shop floor IT landscape, however, continues moving at a glacial pace.

To understand why, consider that this same company has several dozen plants located worldwide: some focusing on complex final car assembly, others producing simple sideboards. These differences have led the plant's processes and IT requirements to diverge greatly. As a result, each plant has developed its own IT system to match their specific requirements.

Driven by a strong need for stability and reliability to keep production running, and constrained by the longer cycles of their operational technology, many of the IT systems in use by these individual plants have been operational for 20 years or longer.

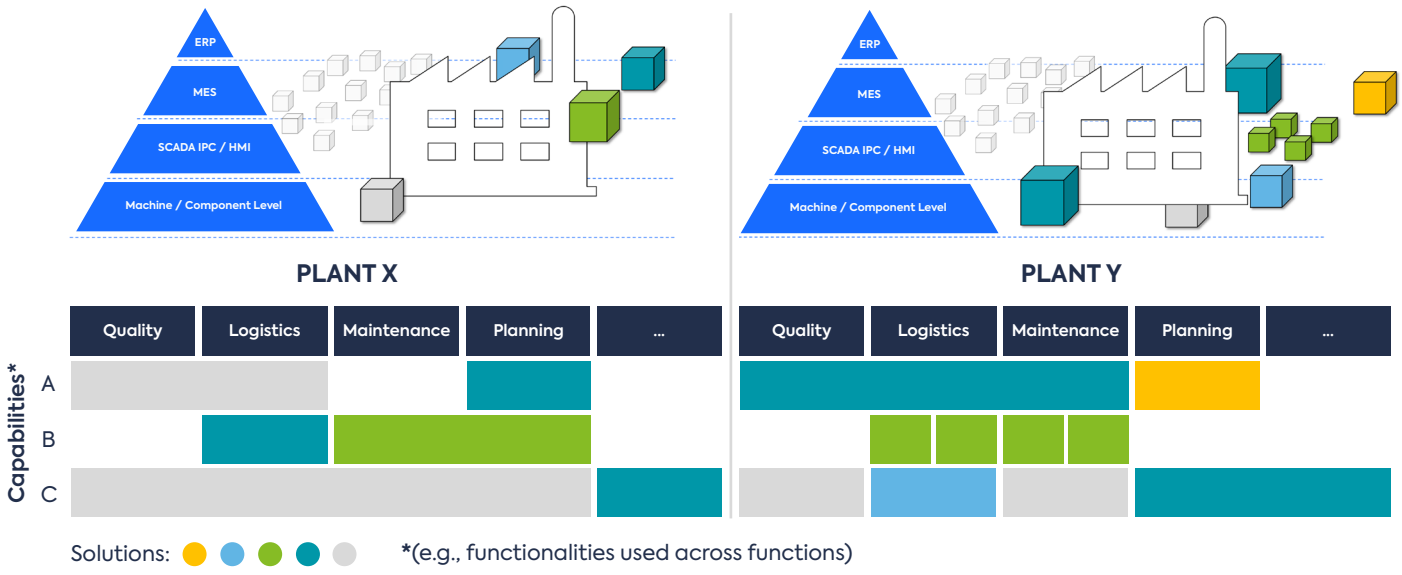
This multitude of systems has become harder and harder to maintain: Key developers have gone into retirement, and the required technical skill is rare to find in the market. The systems are difficult to improve on: incompatible technologies, data siloes, and sparse documentation have led to constant friction points in company-spanning projects, slowing down companies' abilities to manage the rising complexity of today's challenges in production. Figure 1 gives an example of how technological solutions in use by two factories for identical capabilities can vary.

Brownfield challenges:

- Merger and acquisition drivers and trends
- Maintenance becoming increasingly difficult and expensive over time
- Legacy database structure allowing only limited reporting
- Legacy database technologies making integration difficult (e.g., silos)
- Lack of support for modern capabilities leading to limited interoperability
- Planning and implementing with monolithic systems lasting several years
- Sparse documentation of legacy systems leading to high risk/effort during change
- Outdated technologies requiring rare and expensive expertise to sustain

Figure 1

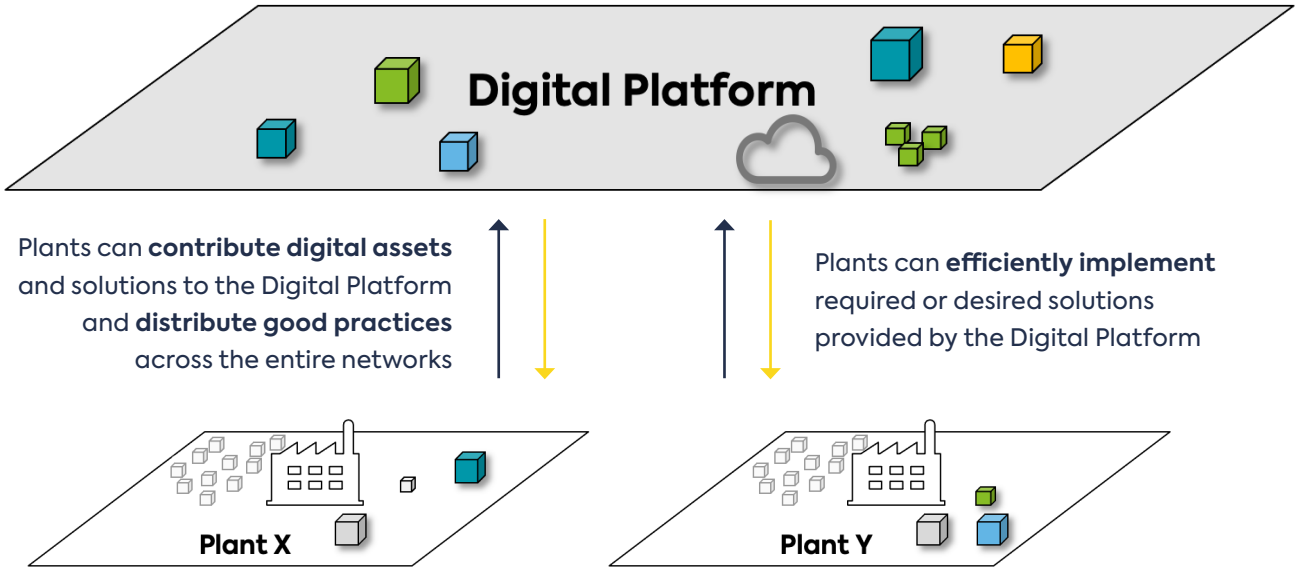
How Technological Solutions Between Factory Plants Can Vary



Source: Deloitte

Figure 2

Connecting Multiple Industrial Enterprises with One Digital Platform



Source: Deloitte

Under pressure to improve efficiency and development speed to keep up with their competition, this company decides to build a digital production platform. By uniting all plants under the umbrella of a singular, best-of-breed platform, they hope to achieve scalability, agility, and the reduction of siloes in the organization. To aid this process, they even establish a new organizational unit called "Digital Production" and hire 20 specialists in data analytics and software engineering. Equipped with a generous budget and high aspirations, the team sets about establishing the new digital production platform. Figure 2 presents a model of how digital platforms can connect industrial enterprises.

Two years later, however, the Digital Production Platform fails to meet the company's expectations. Singular use cases have been developed and are in pilot use but widespread adoption is still out of reach. All the while, frustration has grown in the legacy departments where employees feel unheard and underappreciated for their efforts in maintaining the production backbone. Grumbles about what could have been achieved with the budget reserved for Digital Production are growing and slowly spreading throughout the organization.

Digital platform advantages:

- Responsive to changing mandates and customer expectations
- Enablement for agile and effective workforces
- Recoverable and re-usable assets
- Easier rollouts and quicker digital illustrations of business processes
- Higher impact plus faster scaling of applications and solutions for network effects
- Global transparency and availability of process and performance data
- Interconnected systems conducive for simpler automation processes

Designing a Living Digital Production Platform: The Collaboration Approach

Companies in every industry have experienced similar disappointment when launching Digital Production Platforms. In most cases, Deloitte and LeanIX see the problems arising from conflicts between a company's digital and core business. Instead of piecing together solutions to fit a global strategy, digital services are introduced to accomplish individual use cases with little synergistic value. As well, the benefits of existing assets and solutions are often ignored in favor of new assets. New technologies are regularly implemented before staff are properly trained and given the necessary information repositories to perform troubleshooting efforts.

Building a Digital Production Platform for the wrong reasons (e.g., to satisfy management, to follow trends, to circumvent IT processes/restrictions) and with the wrong approach will almost certainly lead to failure. So, how can companies ensure their brownfield-to-future strategy is a success?

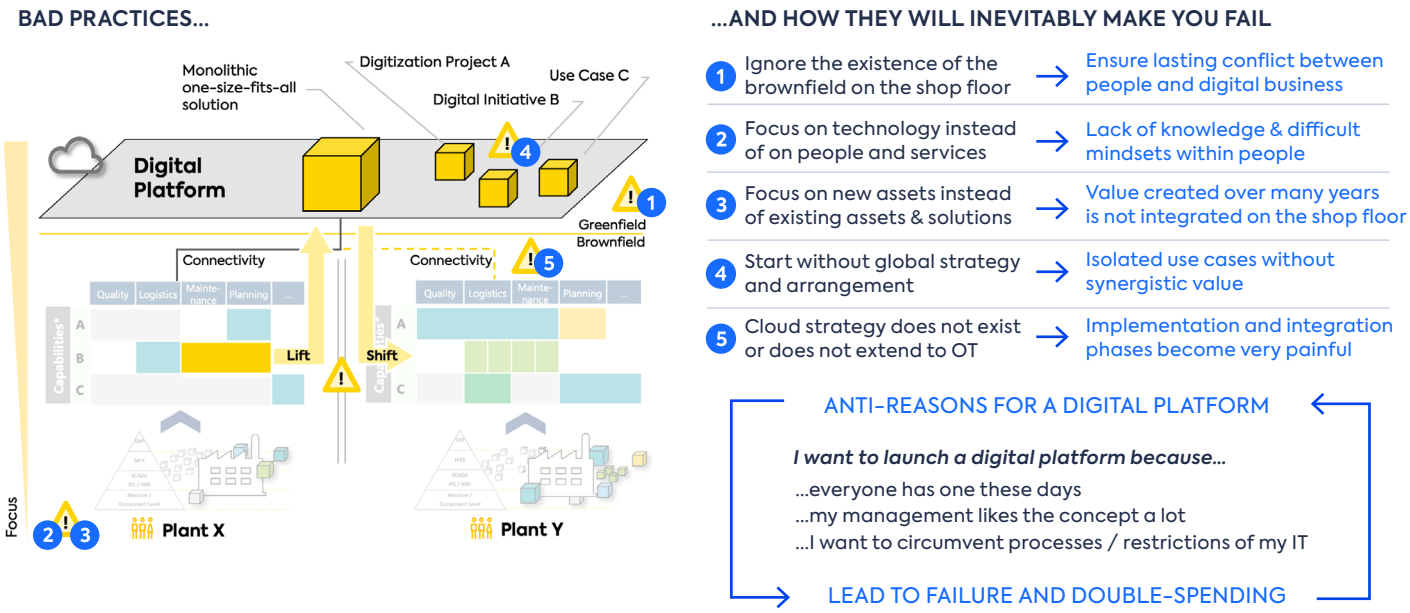
Digital Production Platforms can only thrive by fostering collaboration with those building or using the system. Indeed, given the size and scope of most global Digital Production Platform projects, IT and business users must adopt new communication pathways to sustain connected digital ecosystems. However, in the view of Deloitte and LeanIX, conversations on new and existing synergies will only be fruitful if backed by data-based insights from all corners of an organization — a catalyst for business leaders, CIOs, engineering managers, developers, and others to work together more seamlessly.

To facilitate such collaboration, Deloitte regularly uses products from LeanIX's continuous transformation platform — the Enterprise Architecture Suite (EAS), Cloud Intelligence (CI), and Microservice Intelligence (MI) — to retrieve, store, and analyze details on its clients' IT landscapes. These products are integrated to ensure users across product and corporate IT teams share one single source of truth to contextualize how business is being shaped by decentralized services, transformation initiatives, and daily architectural tasks.

In addition to out-of-the-box integrations to software products (e.g., Jira, ServiceNow, Apptio), LeanIX's collaboration-based approach to managing IT architecture is aided by the tool's user-oriented data model and configurable "Fact Sheets": scorecards for documenting IT assets which form the basis of the platform's intelligent reporting network.

Figure 3

Bad Practices for a Digital Platform and their Consequences



Source: Deloitte

Four Practices to Ensure Technology and People Operate in Unison

STEP 1

Create a joint language: CIOs, business leaders, enterprise architects, software engineers

Just as a common data model enables interoperability between solutions, a common taxonomy is key for facilitating communication between people in different areas of a business. For CIOs and business leaders, this means co-authoring a sound rationale for why brownfield plants are to be future-proofed — and with which resources and at what level of urgency. Together, technological gaps are to be assessed in the context of how they will enhance competitive offerings or support day-to-day operations.

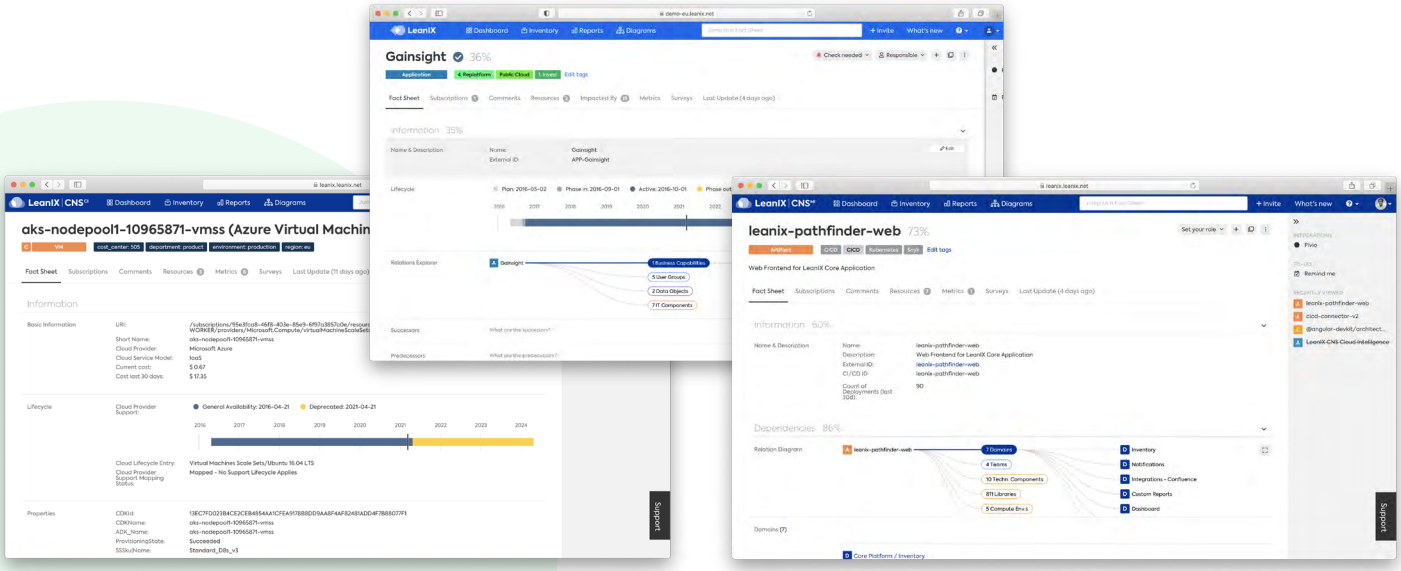
But while splitting applications into microservices can accelerate the time-to-market of products and streamline maintenance efforts, what are the customer-driven reasons behind iterating products more quickly? What business value can be articulated by CIOs to those forced to change their status quo, cooperate with unfamiliar stakeholders, share data, and help decouple monolithic services? And, most importantly, can this value be measured to execute adjustments where needed?

The better CIOs can distill their business's strategic vision, the more successful software engineers will be in generating ideas that will pay towards those business needs and in creating services implementing them. Just as important, a common taxonomy will also make it vastly easier for software engineers to find other related services implemented elsewhere that can be re-used.

If not already obvious, the problems of these various personas — each an integral part in the success of any digital production platform — revolve around one common theme: collaboration. To accelerate information exchanges between these cross-functional teams, LeanIX workspaces allow an unlimited number of users per company to share and update information in real time. This is a particular advantage of the tool for Deloitte when navigating client stakeholder networks and connecting diverse architectural viewpoints.

Figure 4

Examples of Data on Virtual Machines, Microservices, and Applications Stored in LeanIX Fact Sheets



Source: LeanIX GmbH

STEP 2
Enable democratic innovation with top-down basic services

New or locally implemented solutions need to be adapted and benchmarked to become available globally. It is necessary to find the right approach for each functional area depending on the specific requirements of that area and adapt the approach as the organization grows and matures. Platforms like LeanIX thereby offer on-demand, configurable reports for stakeholders across the IT-business network to model capabilities, systematize improvements, and assign responsibilities where needed.

For example, when planning Digital Production Platforms, CIOs and business leaders can use LeanIX to chart high-level targets for plants across functions and ensure that visions cascade. The rollouts of digital assets can be managed centrally via matrix and landscape reports, and roadblocks to the implementation of new services can be dissected via pre-configured or ad hoc data flow reports.

Centers of Excellence, the likes of which can be buoyed by LeanIX's enterprise-wide IT repository, should be introduced to manage day-to-day issues and promote knowledge sharing. These groups can closely measure the rollout of digital services, and based on the success of any particular plant area, best practice deployment models can be set to standardize implementation speeds and predict the risks of new solutions. Above all else, Centers of Excellence are intended to aggregate data for engineering teams and help them connect with the resources they need to become self-organized.

To help developers sustain continuous value delivery yet allow leadership to maintain control, LeanIX can be positioned at the heart of a company's cross-organizational innovation network to illustrate the outcomes a Digital Production Platform's projects in a business-oriented context.

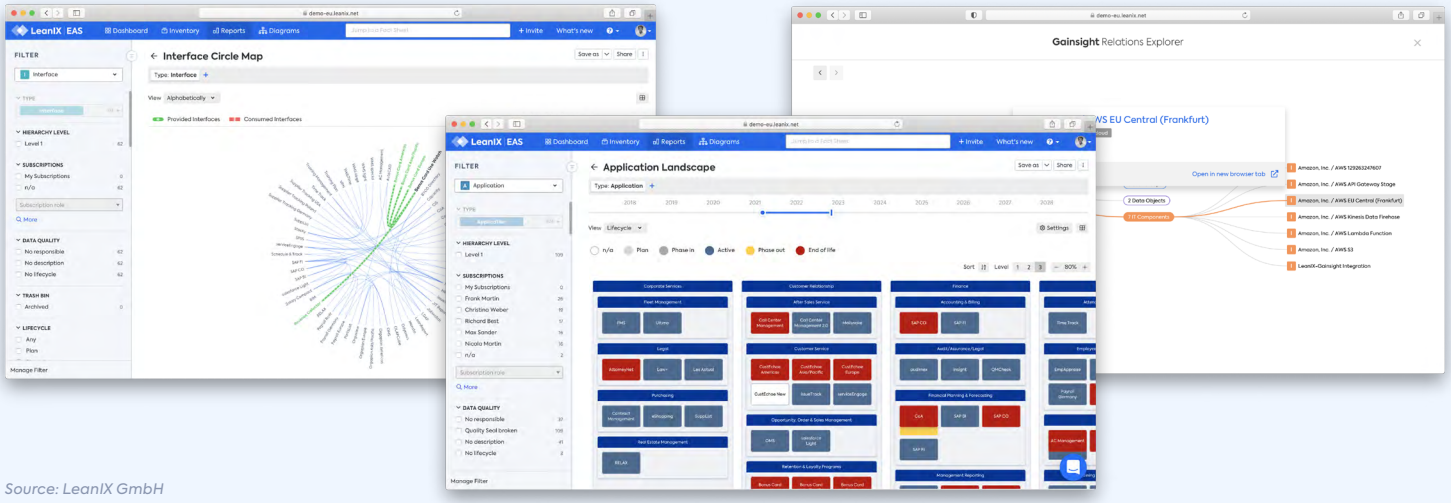
Figure 5
Approaches to Planning Digital Production Platforms

APPROACH 1 **'Top-Down'**	APPROACH 2 **'Engaging'**	APPROACH 3 **'Independant'**
High-level targets cascade across functions and plants with central support	*One plant used as incubator in a specific area to lead broader deployment*	*Technology leads the way with digital assets progressively being deployed*
• **Definition and roll-out** of digital assets **managed centrally** across each plant archetype • **Plant vision** & **targets** as well as **change** is provided and **managed centrally**	• **Centers of Excellence** for defined digital **priorities** managing execution • Non-key priorities to be individually managed at **plant-archetype level ensuring knowledge transfer**	• Headquarter provides **overall guardrails & functionality** addressing overall vision • Adoption of individual journeys on plant level and their respective digital skills collaborating with the business
+ Centralized, globally **integrated**, and scalable approach – **Limited self-initiative** functions and organization through **limited enablement**	+ Facilitated **resources** and **knowledge** distribution + **Increased global leverage** though low risk of isolated solutions	+ Primarily self-organized digital transformation – **Lacking control, integration**, and risk for inefficient resource allocation
EVOLUTION → *Engage and involve others* → *Share responsibilities & enable self-orginization* →		
EXAMPLES:		
One **Digital Factory** in an industrial enterprise specifically dedicated to the creation and scaling of digital assets.	A **Blockchain Institute** led by a plant that makes DLT services and solutions available within the organization.	An **Open App Store** where employees can share and upload content that can be co-edited and peer-reviewed.

Source: Deloitte

Figure 6

Reports and Views From the LeanIX Enterprise Architecture Suite (Interface Circle Map, Application Landscape, Relations Explorer)



Source: LeanIX GmbH

STEP 3

Kick-start the transformation cycle

Digital Platforms make use of the network effect — meaning the more content there is available, the more useful it is for new users to join. This also holds true for Digital Production Platforms. In order to provide an initial value for new joiners, an initial set of services should be developed centrally and made available to everyone. The more value these services provide to their users, the more incentive people have to join.

To begin, Deloitte recommends introducing new solutions in plants based on factors such as regulatory requirements, levels of technical debt, and business criticality. Ideas are to be assessed based on industry design principles, as should the necessary approaches to actually build or migrate applications (e.g., reprogramming, lift and shift, commercial off-the-shelf replacements). Finally, in addition to ensuring solutions are fit for use in plants around the globe, deployments must occur on a global platform (e.g., a cloud hyperscaler) so distributed users can integrate to their shop floor.

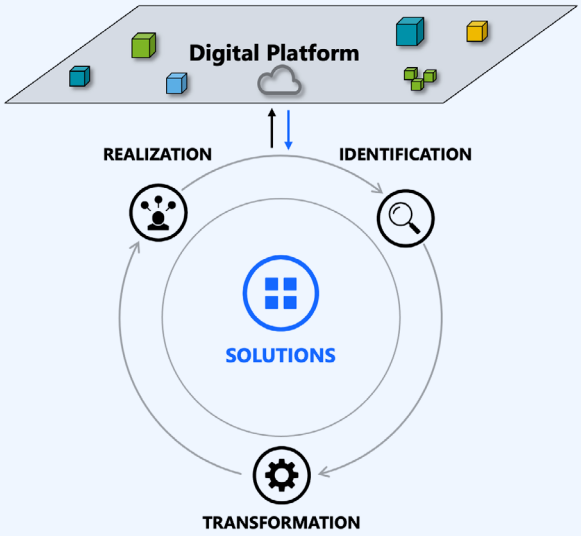
Figure 7

The Digital Production Platform Transformation Cycle

3. Global solution availability
Within an alignment between the plants around the globe, the newly transformed solutions are deployed on a **globally available platform** (hosted by e.g., a hyperscaler). From there on every plant is able to access and integrate the solution on their shop floor.

... and based on this assessment, the chosen solutions require a **holistic preparation** to be ready for the digital platform and other plants.[1]

[1] Deloitte's Method used: EVD for Systems Integration



1. Select the field of action
Define which **areas are prioritized**. Possible factors are:
- Lowest risk of default
- Highest business case
- Regulatory requirements
- Best-in-class solution
- Business strategy
- Sites with largest technical debt
- Urgency

2. Make solution platform-ready
Each solution needs **further analysis and design deep dive** to define the necessary tasks and efforts to bring it to the platform:
- Lift and shift
- Reprogramming
- COTS
- Enhancements
- ...

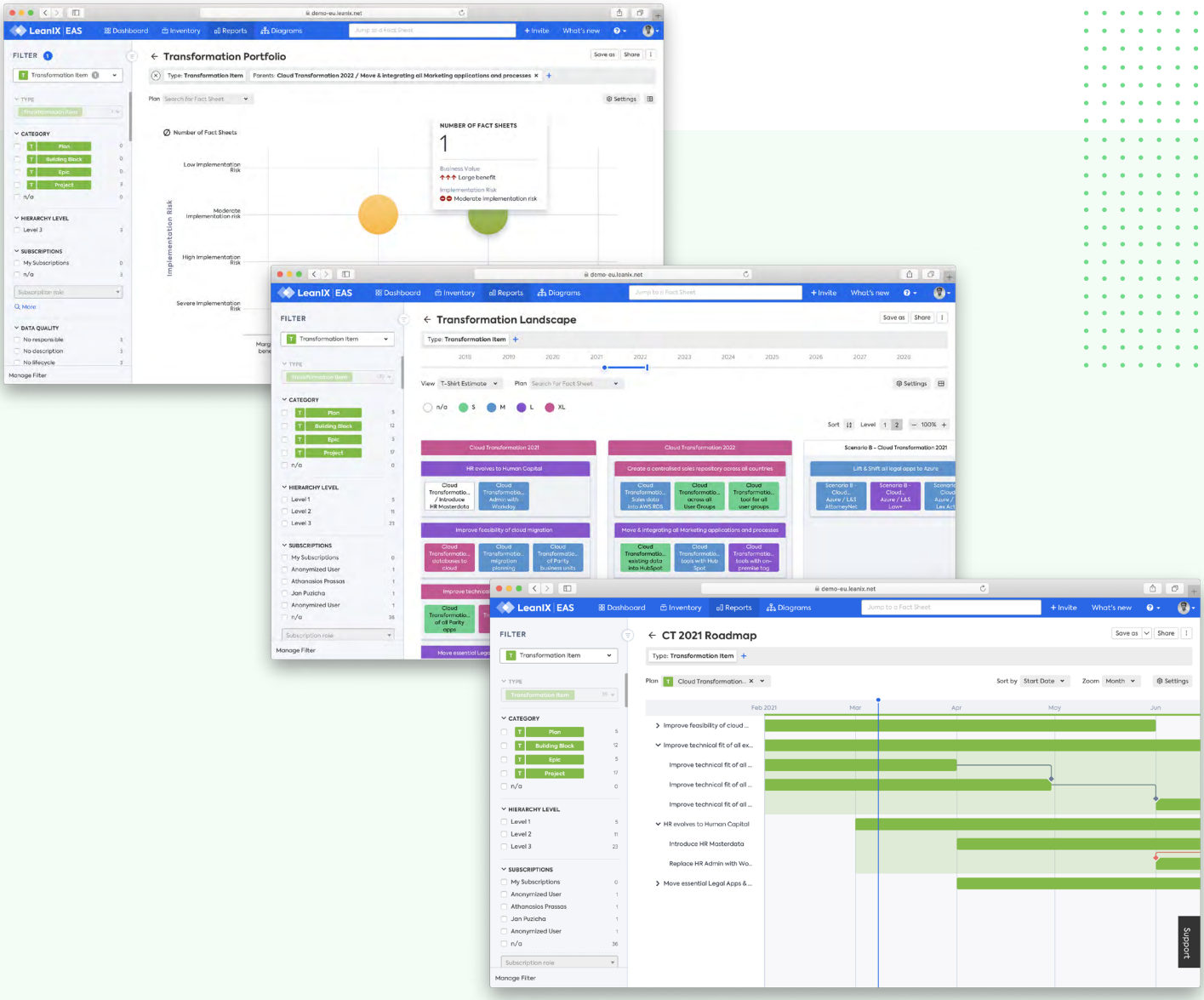
Source: Deloitte

The process above is contingent on holistic overviews of IT landscapes, and LeanIX's Business Transformation Management (BTM) module can be used to deconstruct IT roadmaps and visualize how architectural changes directly affect a business. With features to visualize fast-changing IT landscapes, the module is used to develop short- and long-term IT goals with stakeholders and secure their buy-in during implementation efforts. Of note, BTM enables users to break down IT projects on a granular level and finely-structure all processes and technologies related to a business goal.

Impact modeling can be performed with BTM to analyze how legacy systems can be optimized for new environments and whether other IT entities will be negatively affected as a result. Future outcomes can be previewed throughout a project's duration at user-defined points in time, and alternate transformation scenarios can be compared to validate roadmaps. In the case of cloud migrations, applications can be prioritized based on business objectives and thereafter tracked and monitored at an architectural level.

Figure 8

Reports and Heat Maps from the LeanIX Business Transformation Management Module (Transformation Portfolio, Transformation Landscape, Transformation Roadmap)



Source: LeanIX GmbH

STEP 4
Connect teams with microservices, drive reuse, iterate

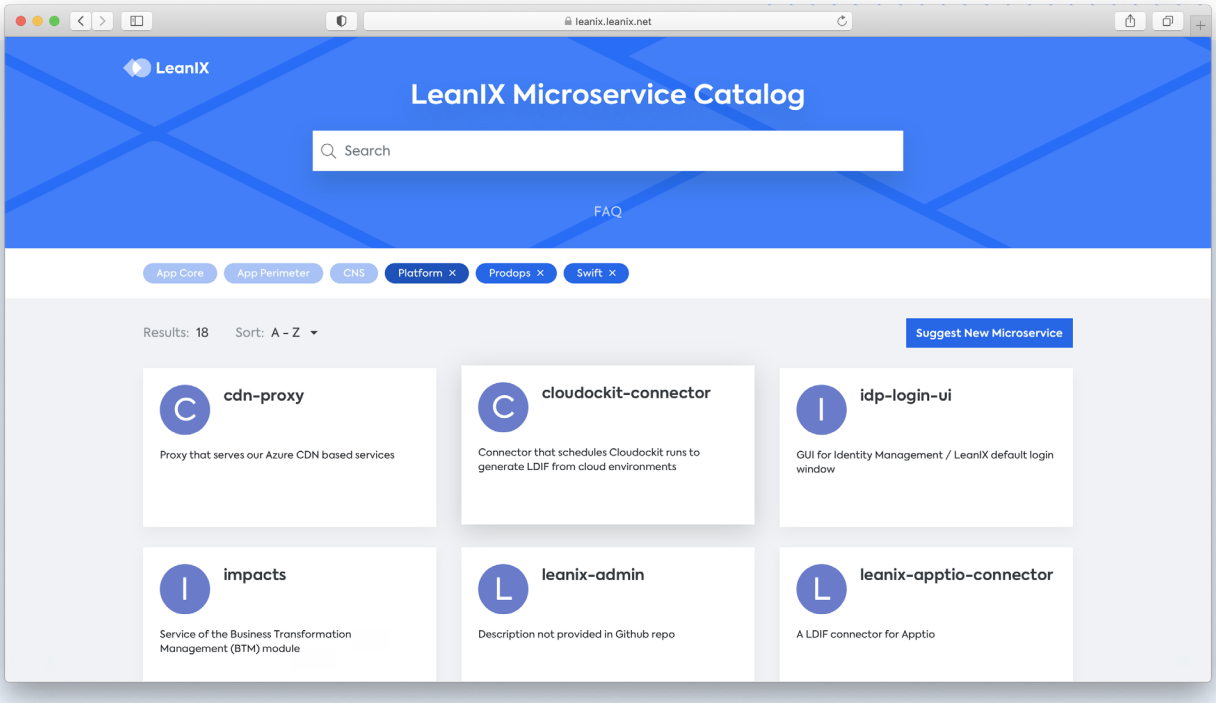
As mentioned earlier, a common pitfall in Digital Production Platforms is failing to leverage pre-existing solutions. It's an issue that often stems from fragmented technical documentation and poor visibility into decentralized applications — a problem that compounds when building microservices at scale to replace monolithic applications. Engineers build these microservices using whatever knowledge is available about interdependencies between technical stacks, user groups, and autonomous teams. The pace at which services can be created or optimized depends on how easily this data can be accessed and analyzed.

The LeanIX Microservices Intelligence (MI) product automates the discovery and cataloging of microservices. The platform can be used by engineering leaders and their teams as a central repository to retrieve microservices documentation (e.g., owner/description metadata, deployments, library usage, runtime information, dependencies, violations) and monitor deployment KPIs. Information is synced from out-of-the-box connectors to CI/CD pipelines and orchestration platforms to ensure proper resource allocation, and end-of-life microservices can be tracked within obsolescence reports.

The transparency generated by such a microservices catalog can shorten the ramp up time of new developers by weeks. Available via one URL and as a self-service, all microservices are added to this catalog upon creation. Further, when used in conjunction with LeanIX EAS, synchronous links between microservices and business capabilities can help EAs gain a complete view of their IT infrastructure, business, and software architecture.

A Digital Production Platform will fail unless stakeholders consistently share data and actively drive iterative improvements. Though budgetary rewards are an obvious incentive to facilitate cross-functional collaboration, it is not the only method of motivating teams of users to help chart improvements.

Figure 9
The LeanIX Microservice Catalog



Source: LeanIX GmbH

In Deloitte's and LeanIX's experience, buy-in can similarly be achieved by presenting tangible gains of efficiency to users via the following categories of advantages:

Improvements

- Predictive maintenance across production lines improves early detection of malfunctions.
- CAx connected with welding robots detects wrong setups at an early stage.

Cost reductions

- Relative downtime reduction and cost savings per plant provide baseline for bonus calculation.
- Example: Reduced rejects related to provided solution.

New processes

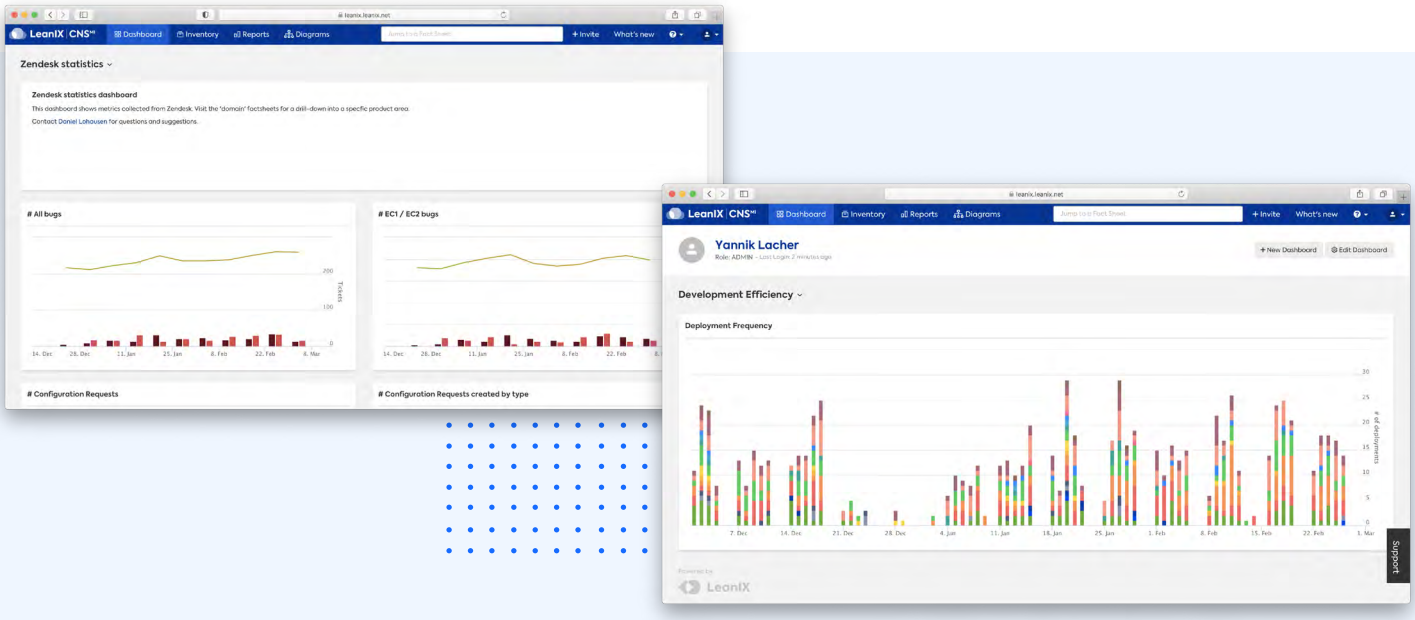
- Better understanding supports process alignment across plants.
- Supply Chain is made transparent (logistic providers can access data and optimize routing and utilization)

To quantify improvements like the above, LeanIX MI comes built-in with dashboards to track over time and contextualize the build and usage pattern of microservices. Metrics like mean time to resolution (MTTR), deployment frequency, and overall number of errors are aggregated based on data pulled directly from the Kubernetes CI/CD pipeline and can thereafter be used to measure development efficiency.

Information from microservices can be coupled with reports in the LeanIX Cloud Intelligence (CI) product to monitor the progress of cloud migrations and help EAs and CIOs govern cloud infrastructures. No matter how broad a cloud landscape, CI is purpose-built to store dynamic volumes of data on every type of cloud native asset. This information can be filtered according to common architectural attributes (i.e., data quality, ownership, hierarchy), and alerts on common cloud violations (e.g., availability, best practices, security, performance, billing) are imported directly from vendor-specific monitoring tools.

Figure 10

KPI dashboards in LeanIX Microservice Intelligence



Source: LeanIX GmbH

Summary

In order to build a thriving Digital Production Platform, value must be provided from all those who take part: This is what Deloitte and LeanIX call democratic innovation.

The following four practices can help with that:

1. Create a joint language through a common taxonomy and data model
2. Enable democratic innovation with top-down basic services
3. Kick-start the cycle by providing initial, high-quality solutions for business
4. Connect teams with microservices, drive reuse, iterate

With a focus on enabling people to build and utilize high-value content, the Digital Production Platform can reduce siloes, enable efficiency, and foster innovation – coming to its full potential.

Deloitte.

LeanIX

The LeanIX platform promotes continuous transformation and enables Corporate IT and Product IT teams to establish superior governance while efficiently organizing, planning, and managing IT landscapes. From SaaS management and enterprise architecture management to the organisation of multicloud environments and the cataloging of microservices for DevOps teams: LeanIX follows a collaborative and data-driven approach, focusing on speed and control in cloud environments and enabling companies to make sound and fast decisions based on comprehensive data.

More than 400 enterprises including adidas, DHL, Volkswagen and numerous well-known technology companies such as Atlassian, Dropbox and Workday trust in LeanIX. More than 40 certified partners such as Deloitte rely on the dynamically growing IT company co-founded in 2012 by CEO André Christ.

With EA Connect Days, LeanIX has been regularly organizing one of the world's most important industry events in the field of Enterprise Architecture since 2014. The company, headquartered in Bonn, has additional locations in San Francisco, Boston and Denver (USA) as well as in Ljubljana (Slovenia), Munich (Germany), Utrecht (Netherlands) and Hyderabad (India) and employs more than 350 people worldwide.