DIGITAL TRANSFORMATION OF THE WORKFORCE

Creating Human Touch for AI Revolution
In this White Paper we delve into the workforce transformation our society is currently experiencing. We are in a state of revolutionary transformation as companies begin to apply artificial intelligence on a massive scale. Within intelligent automation enabled by AI old jobs will die, and new jobs are born at an accelerating pace.

Digitalization affects both business processes and work culture. We believe that in order to thrive in the technology revolution, corporations need to ensure that their employees are ready to face the new challenges and opportunities. Yet, according to the KPMG 2018 Global CEO Outlook report, CEO’s are not investing in the experts that enable change in their culture, or experts in learning and development.

When skill gaps are ignored, or when leadership perpetuates antiquated training programs, the only way to fill those skill gaps is through firing and rehiring large segments of the workforce. This is neither economically, nor socially sustainable, and retraining programs are needed to help companies take advantage of the new technologies.

We wrote this white paper to provide insights into the benefits of proactive retraining and reskilling, and to help you better understand the economics of learning. Whether you are a CEO, executive, HR expert or L&D specialist, this white paper will give you ideas of how to enable both socially and economically sustainable learning programs in your business.

I hope this white paper will raise some questions: how would your business benefit from better learning? How could you make better investments in development? Could you retrain your employees rather than replacing them with workers possessing different skills? If it does, I am happy to talk with you to find out what your business can gain from a proper learning strategy.

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Industry 4.0

We are living in the era of the fourth industrial revolution (4IR). In contrast to past industrial revolutions, this one is driven by the adoption of new technologies at an exponential rate. Analytics, artificial intelligence (AI), cognitive technologies, and the internet of things (IoT) enable a new fusion between the digital and the physical worlds, creating a more holistic, interconnected digital enterprise. Data is collected from physical systems, processed, and then analyzed to drive intelligent actions. These feedback loops generate opportunities for new products and services, create new jobs and allow us to make changes to how we operate our businesses. The change is global, and not only technological, but also social and economic. (Deloitte, 2018).

Many companies face the challenge of implementing AI-based solutions in their business. Artificial intelligence solutions are so powerful that they will transform every industry. AI increases productivity and quality of services so much so that companies will be forced to adopt AI in order to remain competitive.

Intelligent Automation applications set new standards of quality, efficiency, speed, and functionality. The companies that successfully employ intelligent automation may surpass competitors that do not employ intelligent automation. If companies take full advantage of intelligent automation, the overall impact on business could rival that of the enterprise resource planning wave of the 1990s.
Currently, AI is being implemented to automate administrative, routine tasks. We can already see vast implications of AI in the banking industry, where thousands of people are being laid-off. In any field, hundreds of thousands will face the same fate in the very near future. AI is impacting other industries like insurance, public administrative organizations, complex manufacturing, and professional services, and as a result of this transformational impact, we can also expect change on a societal level.

McKinsey Global Institute estimates that 14 percent of the global workforce will need to switch occupational categories by 2030 as the world of work is disrupted (McKinsey, 2018). 50 percent of current work activities are technically automatable by adapting currently demonstrated technologies. In its 20th CEO survey, PwC found that 77 percent of the CEOs interviewed see the availability of key skills as the biggest threat to their business.

Even with the emergence of robots and AI, our human workforce remains integral to the success of our business. It is important to consider the impact that digitization, automation and AI will have, not only on day to day tasks, but on work culture as a whole.

The Employee Revolution

The pressure for transformation in our society is caused by two factors: longevity and the accelerated rate of change in our environment. These prevailing megatrends are illustrated in the figure below by McGowan & Shipley. Gone are the days when formal education was the only education anyone needed to succeed. Now and in the future, most learning will take place within organizations and the ecosystems surrounding them. McGowan claims that all of the successful enterprises today are in the learning business, including e.g Apple, Amazon and Facebook. Lifelong learning is no longer an option, it is a necessity.

The transformation illustrated in Figure 1 will hit many industries. The first industries that will be impacted are those that have predictable environments, like operating machinery or preparing fast food. Machines can work more efficiently than humans by collecting and processing data. Software automation and even more sophisticated forms of AI-based implementations, like Intelligent Automation, will inevitably alter many administrative jobs in the public sector, banking and finance, advanced manufacturing and expertise-based services.

77% of CEOs see the availability of key skills as the biggest threat to their business.
In a recent interview Mr. Reijo Karhinen, CEO of OP Financial Group, expressed his vision of the future. Based on a lifetime of experience in the Finnish banking sector, he predicted that 1/4 of the jobs in banking will disappear in the next few years.\(^6\) McKinsey Global Institute estimates that between 400 million and 800 million individuals could be displaced by automation and need to find new jobs by 2030 around the world\(^5\).

Meet Your New Co-Workers

Employees that retain their jobs will face a new world of working side-by-side with robots and AI. In addition to autonomous vehicles, self service point of sale systems, and fully automated manufacturing robots, we see AI sneaking into jobs that typically require human intelligence. Here are a few examples:

**Artificial Intelligence**

AI applications today are made to help humans think better\(^8\). AI solutions are able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages\(^10\).

**Intelligent Automation**

Intelligent automation is a combination of AI and automation. Intelligent automation systems sense and synthesize vast amounts of information and can automate entire processes or workflows, learning and adapting as they go\(^3\).

**Process Automation Robots**

Robotic Process Automation (RPA), the first stage of Intelligent Automation, is a way to automate repetitive and often rules-based processes. RPA robots undertake transaction processing just like their human counterparts and can work on multiple processes, across multiple functions (e.g. finance cash postings in the morning, work on HR processes in the afternoon)\(^12\).

**Personal Assistants**

AI-powered personal assistants blend into other technologies, making it possible to easily search for information and automate routine tasks, such as calendar booking. Apple’s Siri, Microsoft’s Cortana and Google Assistant are already well known personal assistants.

**Customer Service Bots**

In customer service, chatbots are used to answer questions in a friendly and familiar chat interface. A chatbot can be trained to understand and answer predefined set of frequently asked questions. As a fallback if a bot can’t serve the customer’s request, the bot can forward the question to a real person.

**Digital Learning Assistants**

Chatbots can be very efficient in mimicking human interaction. This was proven by a Georgia Tech professor, who used chatbot to answer students’ questions throughout the semester\(^13\). A chatbot, also known as a digital learning assistant, can be used in corporate environments to help employees learn at their own pace, at any hour of the day, and also has the power to make the learning experience highly personalized.

Not all jobs can be automated. Jobs involved in managing people, applying expertise or creativity, and social interactions will remain in human hands\(^5\). The demand for talent and the right skills is high. Quite often “CEOs wish to find unicorns; the fully-formed employees with the precise skills that the organization needs not only today, but for whatever the future may bring”\(^7\). But as technology continues to change the environments in which we work, the definition of the ‘perfect employee’ will continue to change as well.
The Most Wanted Skills

Soft skills are becoming more valuable for both the employee and the employer, as CEOs see the value in marrying technology with exclusively human capabilities. The modern employees have good social and emotional skills, making them good communicators. The most in-demand skill set includes adaptability, problem-solving, logical reasoning, creativity and leadership. The most desirable employees should be the learners - those with curiosity and the ability to innovate.

Cultivate the workforce’s creativity and digital dexterity. Humans’ contributions should focus on developing new ideas and revising workflows to exploit the latest technological advances.14

Gartner, Future of Work Scenarios 2035: ‘I’d Rather Have a Bot Do It’
Van L. Baker, Tom Austin, 4 April 2018
While society is using technology more than ever, companies must become more humane than ever.
The Two-Sided Challenge

In the chart above, McGowan illustrates how in the future more skilled employees are needed to complete complex tasks side-by-side with Artificial Intelligence solutions. On the other end, the work tasks that are routine and predictable can be replaced with automation and those jobs that can’t be automated are split into smaller tasks (atomization) and given to those who are willing to complete a task at the lowest cost.

Digital enterprises are facing a two-sided challenge: they are forced by competitors into automating their processes and yet they have to keep their reputation as a responsible and respected employer in order to attract and retain talent. The conclusion in the IMF Working Paper was that “automation is good for growth and bad for equality.” How can companies find the balance between remaining competitive through automation and being socially responsible? It seems that while society is using technology more than ever, companies must become more humane than ever.

History has shown us that with new technologies come new jobs. As new technologies emerge, new jobs are born. Dr. Ashkan Fardost reminds us that this industrial revolution, also known as industrial 4.0, is nothing alien; we’ve had machine takeovers in industries many times in the past. Emerging technologies have always led to an increase in the value chain that resulted in new demands in terms of skill and intellect in people. Companies will have to find the right combination of digital assets and human skills in order to realize the advantages of AI. There’s a need for a whole new generation of technology specialists. But who’s going to train them?

Intelligent Automation experts are currently in very high demand, and the gap in the job market is expected to grow over the next ten years. Salaries for Data Scientists, Machine Learning experts and Intelligent Automation experts are already growing quickly. There is a fixed cost associated with hiring and firing, and this creates an economic reason for reskilling part of the workforce.

The skills that companies require of their workforce are already changing. As the rate of change increases, companies will continue to struggle with identifying skill gaps and how job functions must subsequently evolve.

Well-organized knowledge capture and management is crucial in the digital enterprise. How aware are you of the talent that exists within your company and what skill-sets will your company require over the next five to ten years? How can you map and predict the future of your company’s current talent pool and processes? Should you train your existing employees to master the skills, or hire a new generation?
The Economics of Learning

In The Economics of Learning chapter, we introduce the economic model we created to better predict the value that investments in learning create. In our learning economics model, we apply the microeconomics theory and look at the organizational learning as a chain of measurable events that can be recorded and then reflected with the investment made. Finally, the information gathered can be used to predict future learning needs and action points in an organization to maximize the economic benefit.

The model was created in response to the struggle large organizations face when rolling out large learning programs while lacking sufficient tools to measure the learning and prove the economic benefit. Without measurable results, the investments directed to learning and development are guided by intuition, or with cost-savings in mind. Investments in learning often end up being aimed at the wrong areas. Why invest in something without achieving any real advantages?

Our conversations with decision makers in large organizations often have a repeating theme: the cost of learning is kept as low as possible. Learning and development is often seen as an expense rather than an investment. This approach is problematic. If the appropriate investments are not made to ensure the efficacy of your learning program, it may do more harm than good by forcing employees to spend more time with ill-suited learning materials - wasting time and money. Making the proper investments in L&D enables an organization to better plan necessary learning and answer the following questions: Which trainings actually work? What is the benefit for the business of each training? How many employees actually learned what they needed to? Were the right people trained? Why didn’t the learning program generate the outcomes we planned for?

Learning Economics Glossary

**Economic benefit:** The economic value gained through learning activities.

**Retention:** Percentage of learners that gained to a certain level of proficiency, which delivers the economic benefit.

**Time to competence:** How much time it takes to master a new skill up to a certain level of proficiency.

**Production value:** How efficient learning and development is.

**Production ratio:** How much time or resources is spent to create learning activities that deliver certain economic benefit of learning.

**Marginal benefit:** An organization’s marginal benefit is the maximum amount they should pay for learning and development on the margin.

**Marginal cost:** The cost of additional units (labour or other resources) used in planning the learning and producing the learning activities when production value is increased.

**Total cost of learning:** The cost of planning the learning and making the learning activities added to the cost of hours used in learning.
The Principle

The basic principle for microeconomics is the marginal decision rule: how to maximize the value of some objective by making right choices. In the organizational learning context this rule can be phrased: How to maximize the economic benefit of learning by making the right choices when planning the learning program? This can be achieved by optimizing the production value with the production ratio, while keeping the total cost of learning at the desired level.

Production value is the optimal retention (how well people learn and remember the subject) achieved within a reasonable time frame (time to competence). The production value of learning programs usually rises when the production ratio increases, when additional efforts are put into planning learning and producing the learning materials. When the learning materials are of a higher quality, they are easier to learn and remember, and they can be learned in a shorter time frame.

However, when the production ratio reaches a certain point, the marginal benefit, getting more value not only becomes more difficult, but also becomes more costly. After this point is reached, the economic benefit of increasing production value and investing more in the learning should be questioned. How do you know when your production ratio is optimal?
Optimize the Budget, Maximize the Benefits

To define the marginal benefit of an organization, you need to look at the quantity of employees who need the training and compare that to the amount you are willing to invest - what is the total cost you’re willing to pay for learning? It is important to remember that the cost of learning is not only the learning material production. Take the cost of the time your employees spend learning (time to competence) into consideration, as time has a hard cost associated with it regardless of how it is spent.

By optimizing the training for more efficient learning - thereby shortening the time to competence and increasing retention, the average cost per learner can be decreased. As the number of learners grows, even greater economies of scale can be achieved. Find out more in the following example.

In the picture below, we show an example of a Digital Learning Economic Production Value development. This curve has been modeled after data gathered from various learning programs produced at different production rates. The s-curve shows that when the production ratio is increased (more resources are used in making the learning materials), the production value and economic benefit achieved is impacted.

When more time is spent in developing the learning materials, the production value, or the quality of the materials increases. Higher quality makes the learning material easier to learn and simultaneously decreases the time used in learning, shortening time to competence.

![Figure 3: Digital Learning Economic Production Value (Example)](image)

When less time was spent creating the learning materials, the quality of the learning materials often remained low. Moreover, when the quality of the learning material remained low, employees tended to spend more time on learning exercises.

**Example:** Rachel is sent to a classroom training and she decides to share her newly acquired knowledge with her colleagues by sharing the hand-out powerpoint presentation she received at the training. Because the material was made to support the presenter in the classroom situation, it is not suitable learning material for a person who never saw the presentation live. The production value of the learning material is low, and confusing for most people who didn’t view the live training. In this situation, it might even be more efficient for everyone to google the subject and apply the articles related to their daily work.

In some cases, if you only need to train a few people, curated learning material may be the most cost-efficient solution. It might take longer for those people to learn the information, but because there are only a few people learning, neither the time spent training, nor the associated time costs, are too high.
When the hours spent in creating the learning material increase, so does the quality of learning. Our learning economics model aims to find the marginal benefit, the sweet spot where production ratio and production value are optimal. Up to 90% retention can often be reached by reasonable production ratio.

Example: Rachel plans to train 1000 people to master a new skill to a certain level of proficiency. Rachel plans for each individual to use 10 hours for learning - a total of 10,000 man-hours. If Rachel’s learning materials’ production value is low, it can backfire and cause the hours used in learning to multiply. Even if the hours used on learning are doubled, the cost will be high: if the hourly cost for one employee is $60, 10,000 extra hours spent in the learning will cost the organization $600,000. Knowing this, Rachel decides to invest more time and effort in learning materials in order to keep the time spent on learning to 10 hours or less.

By defining the marginal benefit, the budget can be optimized to create the most value for the learners and the business.

At some point the production ratio will rise above the marginal benefit, and further investments could turn into a waste of resources.

Example 1: Rachel sends ten employees to a conference that offers high quality learning and pays $5,000 for each employee. The learning experience is high value and the retention is almost perfect. However, Rachel does not encourage the ten employees to share the gained knowledge enough, so it remains in the minds of the few.

Example 2: Rachel invests $1MM to create high value learning materials with an anticipated retention rate of 100%. Here, the cost of training likely outweighs the marginal benefit. The retention rate is high, but the business value and economic benefits achieved are fewer than the money spent in the training and she ends up losing money.
Predictive Outcomes

It is important to be able to prove the economic benefit of learning - and with learning analytics, you can. Learning analytics will help you to see where your investments are paying off and where the learning materials need to be improved. They can help you spot bottlenecks in the learning materials and optimize the production value of your training.

Predictive analytics offer an interesting angle to the measurement of learning. Predictive analytics is an advanced analytics solution which uses techniques such as data mining, AI, machine learning and predictive modeling to predict the future. It can be used as a tool to help make better decisions. With predictive analytics, choices can be made with the help of carefully analyzed data instead of trusting intuition or a hunch.

When you systematically track learning behaviors, you can produce more accurate learning material in the future and decrease the production ratio. When you choose a predictive learning solution you can better estimate where to invest in learning.
**Onboarding**

**Setup:** You hire 500 new employees with an anticipated onboarding time of 4 months per new hire (2000 total months).

**Goal:** Find savings by decreasing onboarding by one month per employee (reduced total onboarding time to 1500 months).

**Solution:** Optimize the onboarding by producing a more efficient, high-value training program. Set metrics to measure whether the learning is efficient. The time to competence will be shortened, and your new employees will learn the valuable habit of learning within the flow of their day to day work activities.

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**Customer Support**

**Setup:** You train your customers to use your product. If the customer has issues, they will contact customer support.

**Goal:** To decrease the customer support expenses while boosting customer satisfaction and maintaining a positive brand image.

**Solution:** Provide high quality training to your customers (optimize the experience curve). When customers learn to use your product fluently, they will not need to contact the support team as often and the personnel expenses will remain low. When customers are better trained, they are happier with the product and customer retention is higher.

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**Re-skilling**

**Setup:** Intelligent Automation is about to replace the work done by 1000 of your employees. Simultaneously you’ll need 1000 more employees to manage jobs created by AI (machine learning engineers, AI specialists etc).

**Goal:** Find the skills and competencies needed to operate with the new technology as cost-effectively as possible.

**Solution:** The cost of reskilling is lower than firing and hiring, and compared to the traditional reskilling programs, a modern learning experience platform combined with high value learning content will make the training efficient. You will not have to make investments in onboarding training materials, and subject matter expertise is retained throughout the organization.

To hire a machine learning engineer from market will cost $138,000 / year. According to our calculations an organization can transform an administrative worker with a yearly salary cost of $50,000 and an investment of $30,000 to an expert in machine learning.

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**Customer Retention**

**Setup:** Your company offers an IT solution. You are struggling to keep your customers and get new ones, because you lack experts to work on customer projects and organizations.

**Goal:** To make your technology more popular, and gain more customers while also retaining the existing ones.

**Solution:** Offer free training for everyone interested in learning about your technology. The competing technologies often offer free training and simultaneously build an army of experts and consultants, ready to implement the solution for a customer. When you build quality training for your technology, people learn to use the technology better and overall time is saved.
A Sustainable Learning Strategy

The dream of finding unicorns, the fully-formed employees ready to take on any given work task, will always be there. But even the unicorn’s skills will become outdated. It is impossible to know what kind of new job roles we will have in a few years. Or as Gartner puts it: “Nearly 80% of business and IT executives expect skills and knowledge in 10 years to have little resemblance to those their organizations have today.” In order to stay competitive, corporations must act. This is where enterprise performance management and employee development merge together.

According to the World Economic Forum’s report: “Once we know the knowledge and skills requirements of a job, we can assume that employees transitioning out of that job will be able to bring those capacities into any new roles.” Even though job roles change, the skills should transformed to serve new positions. Existing employees always possess knowledge about the company and the work context, that has been built over time. This knowledge offers a solid foundation for successful retraining and development programs.
The Best Employees Are Made, Not Found

The solution in finding (and keeping) the right skills is to develop them from existing internal talent. In a recent paper about IT roles and talent profiles, Gartner recommends CEO’s to "Devise a strategic plan to take bold steps to source and develop talent." The World Economic Forum emphasizes that it is crucial that businesses support their current workforces by training.

Construct a Learning Strategy

Building a corporate academy and a successful learning strategy starts with understanding the business goals, and the skills needed to achieve them. A strong learning and training strategy will make sure that employees’ skills are kept up to date, while jobs continue to evolve with technology. What new skills are needed? What new job roles need to be created? What old job roles are no longer necessary? When new skills are achieved, how could they be applied to future job roles?

The next step is to map the existing skills and knowledge in the company. Once the skills are recorded, the skill gaps can be found and personal learning goals set. Knowing your employees’ skills throughout the process will help you decide which new skills can be trained, and which skills need to be acquired by hiring.

McKinsey Global Institute reports that a traditional approach to training and retraining often stresses theory too much, when in fact practical skills should be the focus. In building the learning strategy, it is important to keep in mind how the learning should actually happen. Should learning be social, digital, practical, formal or informal? Should you offer theory or practical challenges? According to the 70:20:10 learning model it should be all of this, but in the right proportion. Learning should be up to 90% informal, learning by doing or learning from co-workers:

<table>
<thead>
<tr>
<th>INFORMAL LEARNING</th>
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<tbody>
<tr>
<td>On-the-job-learning, challenging assignments</td>
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<tr>
<td>70%</td>
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If a corporate academy built correctly, learning is integrated in the flow of day to day work. Using a sophisticated digital learning solution makes learning new skills more relevant to actual work tasks, and the learning materials are available when they are needed the most, to support the work assignments.

Once constructed, the new learning strategy should be piloted to test these new practices and enable the use of predictive models. Predictive analytics will make it possible to create high quality learning material, as they help in predicting what will happen and recognize the bottlenecks in the processes and areas to improve the content.

Invest in Learning Content

A great learning strategy and a solid technological learning solution are useless without carefully produced learning material. Different types of topics and objectives require different kinds of materials. The right kind of content is optimized for the purpose, personalized for the individual needs, and serves the company objectives. The learning solution in use should bend to meet the requirements of the content and strategy.

When designing learning content, we should ask ourselves these four questions:

1. What needs to be learned?
2. Who needs to learn it?
3. How should the learning materials be constructed and delivered?
4. How do we measure the impact of learning on our business?
When the learning objectives are clear, it becomes very easy to not only monitor and review learning activities and behaviors, but also to link learning activities to business outcomes. Once learning materials are produced, they need to be constantly reviewed. Adjusting the materials with the help of learning analytics makes it possible to increase the production value of the learning program, leading to higher retention and shorter time to competence.

Choose the Right Tools

The learning development market offers a variety of different learning solutions. Out-of-the-box-solutions promise fast success, and highly customizable learning experience platforms (LXP) promise precise results. A corporate academy can be built on both. However, according to Deloitte, the latter offers more tools in personalizing, curating, searching and analyzing the content.

A modern corporate academy harnesses the powers of Artificial Intelligence and Intelligent Automation, and molds these technologies into a system that seamlessly supports the development of the workforce. With a learning experience platform also comes integration capabilities, enabling access to multiple technologies via a single touchpoint.

“Place the learner’s experience and the solution’s usability at the top of the priority list for any new learning project. Evaluate emerging LEPs (Learning Experience Platforms) to enhance (or extend) existing LMS platforms.”

Gartner, Market Guide for Corporate Learning Suites, 15th May, 2018
Analyst Jeff Freyermuth
Valamis - Learning Experience Platform

Valamis LXP is an award-winning platform developed in cooperation with our customers. Valamis enables formal, informal, social, and microlearning, content authoring and management tools. Valamis gives users an access to in-depth analytics in their learning process. Always utilizing the latest technologies, Valamis brings you a digital learning assistant powered with AI. Valamis LXP offers organizations a cost-effective and modular way to upskill their workforce and manage learning and development globally.

AI Supported Learning Guides Your Employees Towards Better Performance

The digital learning assistant is built to support both learners and instructors. It’s ready to help your employees learn at their pace, at any hour of the day, and also has the power to make the learning experience highly personalized.

Behind the friendly user interface of the digital learning assistant is conversational AI with deep learning. The learning assistant collects big data from all the conversations it has, and analyzes it to better understand the learners’ needs and to improve the quality of recommendations. It makes publishing, sharing and storing the learning materials easier and helps you with connecting learning with KPIs.

Valamis has been listed as a Representative Vendor in Gartner’s May 2018 Market Guide for Corporate Learning Suites. Valamis was also recognized in the Learning Experience Platforms -series by Deloitte.
CONCLUSIONS

Get started with an economical learning strategy. Businesses need to be aware of the possibilities that learning can bring to them. Optimal investments in L&D can create massive savings, especially when the alternative is hiring and firing.

Know what your employees are capable of. What skills and knowledge do you have in your organization? When you have a better idea of what skills your employees collectively possess, it is much easier to identify areas for improvement and provide training accordingly.

A good training program is an investment in the future - better customer experience and scalability. Digital training is scalable and when done well, the same materials can be used to train thousands of people.

Analytics help you in making better decisions with predictable outcomes. By tracking all of the learning data available to you, and leveraging predictive analytics, you can begin to understand how the learning impacts business and predict the future training needs.

Not only have AI and intelligent automation become part of the daily work tasks for many, but they are also used to support corporate learning. It is crucial to find the right tools to measure the learning impact and offer the learning in a timely and personalized fashion. Investing in a learning platform that supports intelligent technologies will help you in creating the most efficient learning program for your employees.
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