The new approach to

Building Productivity

Disperse

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Our perspective: a gathering storm

The modern city grew into existence across the past two centuries, beginning with the creation of steam-powered machines which mechanised production methods.

As workers left their rural towns and villages to move closer to the newly-built mills and factories which housed these machines, they laid the foundations of the urban environments we see around us today.

Today, those mills and factories are more likely to house apartments and offices than machines, but they remain central figures in a new revolution which is once again transforming human society.

As the Digital Revolution continues to change the way we live and work, humans are increasingly drawn to urban environments. Half of the world's population now lives in a city and that figure is expected to rise to 64% by 2050[1]. Even with a global pandemic cooling demand for urban real-estate at time of writing, the trend is unlikely to reverse.

Growing populations will continue to stretch city capacities and fuel demand for new buildings and infrastructure, but the industry's challenges stem from a range of root causes beyond simple capacity constraints.

> **Society's demands are more nuanced than just "build bigger" - we want buildings that are greener, more functionally suited for a wide diversity of needs, and more imaginative in their design.**

Consider examples like the sudden ubiquity of the internet and the overnight advent of coworking spaces - or even the implications of a surprise global pandemic.

Working under incredible pressure, with the odds stacked against it in an environment vulnerable to disruption by everything from weather to politics and economic conditions, the construction industry has almost never shied away from a challenge.

But the pressures are mounting - and combining.

As investments and complexity skyrocket and sourcing talent becomes increasingly difficult[2], the industry must contend with many of the same glaring inefficiencies which have long plagued it.

Technology is finally catching up to effectively address these issues. But builders must become as unafraid of technology as they are of challenges in the field; operators who fail to do so will be ill-equipped to withstand the increased pressures.

POWERED BY PEOPLE

There is no "silver bullet" to construction's productivity challenges, but a human-centric and dynamic industry requires a set of human-centric and dynamic solutions.

Good project leaders understand that capable people are their best line of defense against missed milestones and the inevitable minefield of "unknown-unknowns" every project runs into.

The path to addressing the productivity gap is in finding a way to enhance and unlock the capabilities of the industry's best asset: its people. Productivity will come from helping people to achieve their full potential on every project, and from feeding project insights back into the shared understanding of the wider organisations.

As technologists, we have worked alongside our customers - who are some of the world's leading builders and developers - to develop a tech-led approach which does exactly that.

For businesses, this is about opening up new opportunities by improving stability and productivity. How we deliver is increasingly out of sync with society's demands and the accelerating pace of change outside our industry. As we bridge that gap, builders and technologists have a real opportunity to create new processes and pathways to success.

In this paper, we are going to explore the key challenges that we have observed at the heart of the construction industry's productivity gap, and detail our field-tested approach to overcoming them.

WELCOME TO BUILDING PRODUCTIVITY WITH DISPERSE.

Society’s demands are more nuanced than just “build bigger” - we want buildings that are greener, more functionally suited for a wide diversity of needs, and more imaginative in their design.

02

The state of the industry: understanding the productivity gap

"In large and complex construction, every complication or missed opportunity can create a multitude cascading problems. We collect data and measure what's actually been done to understand the complications we're facing, but it is not just about tracking. It is about looking at what we can do to accelerate processes or reallocate resources, and possible ways to deal with the challenges we meet."

Dr. 'Kolade Akiyode, Planner

The manufacturing industry is often praised for productivity that has skyrocketed year on year thanks to efficiencies from technology and automation. Conversely, productivity has remained stagnant in the global construction industry, and the result is a global productivity gap valued at $1.6 trillion[3] (a number whose magnitude is far less interesting than its causes).

While it is true that the construction industry has not kept pace with technological advances in the same way manufacturing has, a direct comparison between the two industries is fundamentally flawed. The construction productivity problem is much harder to solve.

Automating a production line is a relatively simple process; automating construction processes is exponentially more difficult. While manufacturing operations take place in a set environment under consistent conditions that lend themselves to initiatives like lean and digitisation, every construction project is inherently unique.

THE PRODUCTIVITY EQUATION

While the average worker in the global economy produces $37 of added value per hour, the average construction worker produces just $25. That $12 shortfall adds up to a staggering $1.6 trillion of lost value for the industry as a whole[4].

This productivity gap is not a new problem - it has troubled industry operators, economists and politicians for decades. But, productivity has been fixed at an almost-negligible 1% increase per year for the last twenty years[5].

Cost and time overruns have become standard: a 2016 McKinsey report found that the average project overran its scheduled completion date by 20% and that associated cost overruns were as high as 80%[6]. Rework has been found to account for anywhere between 4% and 9% of a project's final total cost[7].

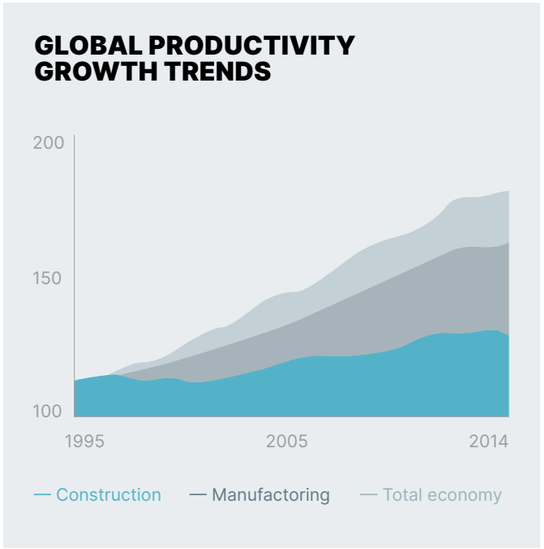
Working in an industry where profit margins are tight and the forces of nature or economics can flare up without warning, many operators have also developed a low-risk mindset which avoids innovation.

The McKinsey report "the Next Normal in Construction" published earlier this year advised industry players that resistance to change is no longer an option: evolution is essential. It also predicted rich rewards to those who move first.

"Operators who have positioned themselves correctly may see their profit pools double from 5% to 10%. Those operators who are not positioned correctly will find themselves left behind, unable to attract the talent they need and unable to match the efficiencies of their rivals.[3]"

"Players that move fast and manage to radically outperform their competitors could grab the lion's share of the $265 billion in new and shifting profits and see valuations more akin to those of Silicon Valley start-ups than traditional construction firms.[3]"

McKinsey&Company, 2017



McKinsey&Company, 2017

03

The roots of the productivity problem

"Tasks are interdependent and every project is essentially a prototype. Components, people and geography have never coexisted and are therefore unique, so issues have a tendency to cascade."

Liam Florey, Project Director

Writing in 1873, a veteran Prussian general coined the term ‘fog of war’ to describe the uncertainty and lack of clarity which clouds the information available to battlefield commanders in wartime situations.

He advised fellow generals to plough resources into cultivating the most extensive intelligence networks possible, on the grounds that the results of access to better information would in the end justify any costs involved in obtaining it.

It’s fair to draw a few parallels between a construction project and a battlefield.

At the heart of our industry’s productivity problem, we have studied a collection of seemingly distinct root challenges that actually work together to constrain construction output.

Taken alone, each of these challenges could potentially pose a threat to a business. In concert, they have created a productivity problem which is greater than the sum of its parts.

We have sorted these challenges into three levels for consideration:

→ **Systemic, industry-wide productivity challenges which tie us to the status quo**

→ **Organisational productivity challenges that affect business units from HQ to project-level, and which limit construction businesses from achieving economies of scale**

→ **Personal productivity challenges that bog down staff at an individual level, slowing down delivery and making the job less satisfying**

Large scale construction projects are a symphony of moving parts which require masterful management and non-stop heroic efforts of problem-solving.

03.1 Systemic, industry-wide productivity challenges

Challenges that are systemic are everywhere in the industry. They aren’t necessarily anyone’s fault, but they impact everyone. Every executive and project leader in the business has probably felt them at some point and probably can feel them growing.

COMPLEXITY, VARIABILITY AND INTERDEPENDENCE ARE ACCEPTED AS THE STATUS QUO

Because construction works are an everyday sight for billions of people worldwide, outsiders have a tendency to assume there is something routine about them, as if completing a building is like putting together an extra-large piece of flat-pack furniture.

If you’re an industry insider, you know that large scale construction projects are a symphony of moving parts which require masterful management and non-stop heroic efforts of problem-solving.

Complexity, variability and interdependence are so endemic to our industry that they’ve become part of the status quo. They are often avoided or treated as conditions whose implications can’t be planned for in advance.

Rather than developing systems to proactively navigate these conditions and make them manageable, our industry has mostly approached them reactively. Builders take their chances in the field, betting on their people’s capability to overcome challenges.

But these conditions are not static; they are constantly evolving, becoming more severe and less manageable. Projects will only continue to become more complex and more unique, and interdependency will create bigger ripple effects that stretch further and impact a greater number of players. The system carries too much risk.

We cannot face this unstable and inefficient status quo with apathy or indifference anymore. Sometimes complexity, variability and interdependence can be mitigated or neutralised - but when they can’t, we need systems that are much better suited for navigating their implications.

“UNKNOWN-UNKNOWNS” ARE THE NORM AND THEY IMPACT PRODUCTIVITY

In December 1972, American mathematician and meteorologist Edward Lorenz stepped on stage at a national science convention and introduced the world to ‘The Butterfly Effect’.

His lecture - entitled “Can the flap of a butterfly’s wings in Brazil set off a tornado In Texas?” - used complex mathematical formulas to trace hurricane winds in North America back to fauna activity in the Amazon rainforest.

Much like Lorenz’s assessment of the natural world, the construction industry is a complex and interdependent ecosystem. After eleven years of intense study, Lorenz had formulated something the construction industry has known forever: small events in a sensitive system can have enormous unforeseen consequences further down the line.

In addition to the location, duration, size, type and design of the project, project teams must also work around factors such as legal regulations, procurement logistics, weather conditions and personnel availability. Sites become a network of interdependent actors, most of whom are working around different performance triggers, key dates and sectional completion criteria.

The end result is an ecosystem so carefully balanced that even a moderate disruption can have enormous knock-on consequences.

The impact of escalating problems is all too familiar to project leadership. Rework, personnel shortages and material supply disruptions have always played havoc with programmes.

These disruptions are “unknown-unknowns”: we don’t know when or if they’re going to happen, how they will manifest or what their effects will be. The volume and impact of these cumulative changes is often what determines productivity, and their ripple effects are what project leadership loses sleep over.

THE ROOTS OF THESE SYSTEMIC PROBLEMS: AGGREGATE WEAKNESSES FROM MEASUREMENT & REPORTING ON PROJECTS

The construction industry’s systemic productivity issues start with measurement & reporting problems at the project level.

Managing a programme by making constant adjustments is the norm, and project staff are accustomed to thinking on their feet. But, the biggest problem is not with the adjustments; it is with the information upon which those adjustments are based, and the way in which it is collected and shared throughout a project or an organisation.

Most reports are manually generated, making them prone to human error. The more a site operates on disjointed systems and inconsistent views of reality, the more frequently it can expect to encounter the need for rework.

> **Flawed measurement at a project level damages synchronicity of the plan versus the reality of the as-is, which in turn causes more issues. Over time, the aggregate of these creates a vicious cycle that severely constrains the effectiveness with which a team can respond to changing circumstances.**

When it suddenly turns out that a section of work is incomplete or incorrect, project leaders find themselves having to frantically rearrange programmes as they scramble to address inaccuracies in reporting. In effect, leadership is flying with one eye open.

> **There is no reliable shared truth from which all levels of management can operate.**

Without access to a precise record of the whole project’s state, project leaders cannot effectively assess the impact on critical paths and calculate effective responses to challenges. Without a holistic, integrated data processing system, the challenges cannot be surmounted and the status quo remains.

There is no reliable shared truth from which all levels of management can operate.

03.2 Organisational productivity challenges

When businesses manage to reliably increase output and lower costs, they accelerate overall growth and create a competitive advantage in the market. In most industries, larger businesses benefit from more predictable and specialised processes that are continuously improved, which leads to bigger savings and lower unit costs. This is called “economies of scale.”

While systemic challenges can often feel as hard to control as they are pervasive, organisational productivity challenges are much more tangible and therefore more straightforward to address. By solving this set of productivity challenges, builders have an opportunity to improve the overall productivity and stability of their businesses over time - and ultimately achieve economies of scale.

CONSTRUCTION BUSINESSES STRUGGLE TO CAPTURE BEST PRACTICES AND SHARE THEM ACROSS FULL ORGANISATIONS

Despite a wide range of potential pitfalls on any one project, the best project leaders in the business keep delivering incredible additions to our built environment. This is why talent retention is such a focus within the industry.

But, the over-reliance on individuals means that the valuable best practices and ways of working can be lost when teams part ways to move on to the next job. As contractors and subcontractors move from project to project, united only for the length of time it takes for them to complete the particular work they are responsible for, they carry their own methods and processes with them.

Builders are struggling to aggregate and circulate a consistent set of best practices to create widespread systems of staff development within their ranks.

> **If firms do not actively work to build a body of knowledge and share information at all levels, they inject risk into their processes. Project output becomes dependent upon individuals rather than systems and entire companies become dependent on the cash flow of a handful of projects, putting entire businesses at risk. The system has become a house of cards.**

BUSINESS LEADERS LACK DATA STRUCTURES TO DRIVE MEANINGFUL TRANSFORMATION OR LEND SUPPORT TO ONGOING OPERATIONS

Elevating and transforming ways of working in any large scale organisation requires a data-driven approach to collect, structure and share project and enterprise-level data.

Thus far, construction companies have struggled to create an osmosis of operational data between project teams and central business units that could remove uncertainty from material and labour supply chains and identify trends based on data. Each project in a portfolio comes with a degree of unpredictability which accumulates, bit by bit, and eventually the aggregate instability and lack of standardisation makes effective controls and risk management extremely difficult.

Initiatives from BIM to Business Intelligence systems are looking to address some of these challenges but haven't quite lived up to their potential yet. BIM adds value during pre-construction, but in its current state is too heavy to provide an actionable and maintainable flow of information during construction. BI initiatives are struggling with inconsistent, incomplete, unstructured data from construction sites.

Builders have yet to develop an effective and reliable approach for delivering reliable information to decision makers without creating delays, inconsistencies and a surplus of overhead for site-teams and business units.

SUPPLY-SIDE SHORTAGES OF TALENT AND LABOUR

One critical organisational challenge that every construction business deals with is the shortage of talent and skilled labour.

> **In any industry with a supply-side shortage of talent there are two imperatives: work to improve recruitment and retention, and work more efficiently with the resources that you have.**

"These top organisations on our Future-Ready Index rate attracting talent as the second most important challenge for the entire industry; this is in stark contrast to all other respondents, who only rank talent in fifth place," the report states[8].

The conclusion from KPMG is clear: if attracting new talent is not one of your organisation’s absolute top priorities, your organisation cannot be considered future-ready.

While the industry focuses on finding ways to attract talent, it must also work to retain it. Great pay alone won’t prove enticing enough to persuade the best talent to spend their working lives drowning in paper and doing mundane administration.

Reliance on archaic practices won’t attract young workers who see technology as an intrinsic part of life and have no interest in working without it. The industry is struggling to attract the next generation of talent as a large swathe of the current workforce is approaching retirement age. Securing and retaining talent has become a pressing issue[2].

People who have grown up with smartphones, who see the digital world as just a normal part of their everyday being, are not going to be attracted by outdated or chaotic working practices. The imperative is to embrace digital and attract a new generation of builders.

On the latter imperative to work more efficiently, the answer to the riddle is the same: lean into technology and take advantage of advances in data processing that will elevate decision-making at all echelons of an organisation, from project to boardroom.

Work to improve recruitment and retention, and work more efficiently with the resources that you have.

03.3 Personal productivity challenges

People are at the heart of our industry. Of all the ways to drive building productivity in the construction business, the most impactful is to empower the men and women of the industry to do the most meaningful, enjoyable and exciting work.

The most immediate opportunities for productivity improvements happen at the project level. They stem from giving people a chance to do what they do best rather than forcing them to do something that human brain power isn’t suited for, and which they do not enjoy.

VALUABLE TIME & HUMAN CAPABILITY ARE MISUSED ON ADMIN

On building projects, admin devours everyone’s time up to the very top levels of management. Teams are burning time on endless admin, and nobody is enjoying it.

> **Anybody in this industry will tell you: nobody becomes a builder because they love spending most of their days filling in reports and searching for the information required to get on with making decisions, but that’s what happens.**

Highly-paid project managers routinely spend large portions of their days searching through emails, spreadsheets and WhatsApp chats for information they need to drive progress. They’re burning hours digging through contracts or commuting to the site at odd hours to get to an answer. Days are spent aggregating reports and filling in information.

A lot of time gets wasted on this. In 2012, a McKinsey report[9] (not specific to construction) had it at an average of 1.8 hours (19%) per day. That’s about one full workday per week spent entirely on searching for information.

Multiply that by the number of workers on a project who need to search for information on a daily basis and the amount of lost time soon becomes staggering: fifty workers will lose 1,800 hours in a month, or 21,600 hours in a year.

Those lost hours are inefficient and they are expensive. For every £65,000 salary paid to a UK construction project manager, more than £12,000 is effectively being spent for professionals to function as admin as-

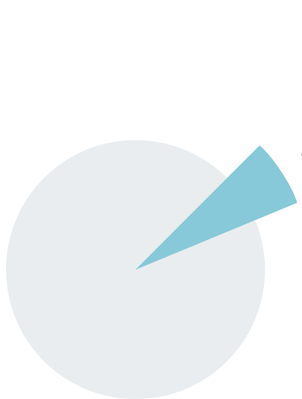
sistants. In an industry with a talent shortage, this is an enormous threat[10].

Administrative tasks and data-gathering burn valuable time, but there is an even greater threat: these are not the kind of activities which motivate project teams or play to their core strengths.

> **The parts of a job that a team enjoys the least will always become the activities which are carried out the least effectively, and project teams are made up of people who enjoy problem solving, finding creative solutions and directing activity - not people who take pleasure in putting numbers into boxes.**

This weakness is why the flow of information from project sites is such a structural problem and why business improvement initiatives frequently fail: data coming from the sites is mostly unreliable.

Fifty workers will lose 1,800 hours in a month, or 21,600 hours in a year.



04

Why traditional project measurement (and most tech solutions) fail to boost building productivity

"The biggest impact, looking into the future in the construction industry, is consistency in data collection. That's really important because we've had to deal with the multiplicity of data, or the integrity of data. It’s not about the data being wrong. It’s really just about the nature and the perspective of who is collecting it and how it’s being interpreted."

Dr. 'Kolade Akiyode, Planner

INFORMATION GAPS AND OPEN FEEDBACK LOOPS

As we’ve explored above, the industry is rife with subjectivity and information gaps between stakeholders. Like a game of ‘broken telephone’, every degree of separation between people creates another layer of ambiguity, subjectivity and potential misalignment from manual data collection.

Bad feedback loops destroy productivity, and our industry has no shortage of them.

THE FAILING OF TRADITIONAL METHODS ON MODERN PROJECTS

We live in an age of semi-autonomous cars and home appliances equipped with artificial intelligence, but progress on construction projects is still commonly measured by people walking the site and manually recording their observations.

This is the same method used thousands of years ago by the people who built the Pyramids, (albeit the tablets used today are made of metal and glass rather than stone.)

The old way of doing things simply will not work any longer.

TECHNOLOGY’S FAILURE TO MEANINGFULLY BOOST BUILDING PRODUCTIVITY (SO FAR)

There are technologies on the market today which do improve ways of working by offering a platform for managing supply chain processes and facilitating construction workflows. These systems are designed to manage, control and monitor building inputs.

But they do not account for measurement or analysis of construction output, and they do not identify productivity patterns and trends. They do not measure what’s actually been done on site and they are still dependent on human input.

" This isn’t just about optimising workflows or doing things faster, but rather about changing the way we operate to do things in a more integrated, consistent and data-driven manner."

Paul Connolly, Technical Services Director for Residential and Commercial

05

The new approach: a system to measure, manage and continuously improve building productivity

Let's review what we know.

Main contractors overseeing large projects are operating in fast-paced, risky, low-margin environments. The work isn't getting any less complex, and the complexity only lends itself to the potential for things to go wrong and hide in the details.

Processes can vary wildly between teams, and there is still an over-reliance on manual data-gathering and subjective reporting.

> **When bad or incomplete data enters the system and that information gets shared across teams, misalignments start piling up. Operators deviate from the plan, mistakes get missed and programmes go sideways. Bad feedback loops of information around outputs impact decision making, which leads to more bad inputs, and so on.**

Project-level learning doesn’t make its way back to central business units or to other project teams, and senior management has far less visibility into operations than they rightfully should.

The entire scene is compounded by a shortage of talent, and the resultant imperative to do more with less.

So what does a solution look like?

The holistic solution is an approach that efficiently addresses all three levels of challenges outlined above. This is the new approach to building productivity, born from a close partnership between some of the world’s leading builders and technologists.

It is designed in a way that harnesses our industry’s greatest strengths, and which neutralises the systemic weaknesses that create instability. It is a hybrid model of operation in which humans are assisted by machines, incorporating advancements from the fields of machine learning (computer vision), data science and cloud connectivity.

05.1 Systemic productivity imperative: create a reliable shared truth between all levels of management

As we know, large scale projects are increasingly complex and interdependent with unique requirements, and demands regularly change during projects.

These circumstances are what typically lead to inevitable finger pointing between owners, designers and builders. In an ideal world, designs and building requirements would be mapped out early and done perfectly on the first try, and programmes and costs would hold steady throughout the lifetime of the project. But, that's not the world we're living in.

MANAGE SYSTEMIC PRODUCTIVITY CHALLENGES AND ACCELERATING CHANGE WITH UNIVERSAL, CLOUD-CONNECTED DATA STREAMS

The reality is, most projects will continue to become more complex. Designs and building requirements will become more unique, and changes in societal and building demands will happen more frequently.

The imperative for leadership is to raise the quality, relevance and availability of information for everyone, and improve everyone's capability to make the best possible decisions, faster. Create an objective understanding of what's really been delivered on every project at any given moment.

SHINE A LIGHT ON DARK PLACES WITH MACHINE LEARNING TO ELIMINATE "UNKNOWN-UNKNOWNS"

Let's look at how people normally solve problems and gain understanding. There are two major types of reasoning that we use to get answers and make decisions, deductive and inductive.

Using deductive (top-down) reasoning, someone starts with a hypothesis and looks for data to support or disprove that hypothesis. An example of deductive reasoning would be: "I believe we're moving more slowly than planned on specific floors, so I'll review this week's photo evidence. If I am correct, I'll use that information to decide what actions to take."

Conversely, inductive (bottom-up) reasoning begins with collecting, processing and analysing data, and then uses the resultant observations to draw conclusions. An example of inductive reasoning is a traditional site-walk where teams note down observable progress in as much detail as possible, hoping to spot potential problems, patterns or trends.

Fundamentally, humans are much stronger at deductive reasoning while computers are much stronger at inductive reasoning. Machines are excellent at exposing patterns from data, and human beings are exceptional at quickly solving complex problems with even limited information.

There is real beauty in how humans and machines can work together in this way; cutting edge machine-learning technology like computer-vision algorithms can identify problems early on, and human operators can get right to solving them.

The imperative is to create harmony between man and machine by balancing the strengths of each.

Systems powered by machine learning in particular have a massive advantage when it comes to exposing those "unknown-unknowns" on a project because they can sort tirelessly through endless troves of data to expose patterns and potential problems that human beings would inevitably miss.

FOCUS ON

Creating shared truth on Mayfair development

Lodha, Mace & Disperse

In 2017, Lodha and Mace started construction on the flagship London development of Grosvenor Square in Mayfair. Disperse technology was in use at No 1 Grosvenor Square since 2018, but when the first wave of Covid-19 hit, project leadership pressed pause and used the system to take stock of the situation. The approach provided universal remote access to the site and helped to guide and inform conversations with subcontractors about reopening safely. The team made changes to processes to accommodate for social distancing per CLC guidelines, and within six weeks of restarting work had returned to roughly 70% capacity with around 400 people. Leadership calculated that they had recovered eight to ten weeks which would have otherwise been lost.

Read the full story online at BIM+

05.2 Organisational productivity imperative: implement a connected ecosystem of project and enterprise data to drive transformation

Because a construction firm's capacity to generate revenue is directly linked to its capability to deliver, the businesses which can deliver fastest and most reliably will naturally have the most predictable and healthiest cash flow. Predictable delivery creates a virtuous cycle of smarter operating and more growth opportunity.

So how does a construction business make delivery as efficient and predictable as possible?

PRIORITISE CONTINUOUS IMPROVEMENT FROM LEARNING CULTURES AND DATA CONNECTIVITY ACROSS THE FULL ORGANISATION

Start by prioritising the creation of a learning culture built on data. Leverage digital systems that will create a structured and free flowing exchange of data and information between project teams and central business units.

If your company employs dozens or hundreds of experienced project leaders, you have an opportunity to elevate your less experienced staff by capturing and sharing best practices across the full organisation.

Next, create transparency that permeates every level of the business to optimise decision making and process stability. Important decisions at every level get made based on understanding the true state of play, whether that's on one project or across an entire portfolio.

Ensure that everyone has access to a fully objective and precise understanding of what's really going on every project at any given moment, no matter where they are in the world. Create a body of knowledge for decision making and a system to drive transformation, from the project site to the boardroom.

At a project level, the imperative is to guarantee that every project team has quick and easy access to information concerning the reality of their project, in as much granular detail as possible. At an enterprise level, endeavour to collect, structure and democratise data, information and best practices.

Construction businesses that successfully create this osmosis of information will find themselves executing more efficiently and with fewer cost overruns. They will put themselves in position to open new revenue streams and take on more work.

RETAIN TALENT AND MAXIMISE EFFICIENCY BY GIVING TEAMS THE TOOLS TO DRIVE BETTER OUTPUT

A study from project management software provider Monday.com (formerly known as Dapulse) revealed that three of the top factors to influence employee happiness were: "working for a company that was best in its field, supported innovation, and had the kind of culture that they wanted to work in.[11]"

High performers are drawn to winning and innovative companies. Teams of high performers tend to be happiest when the work they're doing is satisfying and closely aligned with their expectations of the job, and when the work is meaningful and impactful.

The imperatives are twofold: don't drive away new talent by bogging teams down with antiquated or low-leverage practices, and give them the tools, trust and purview to launch your business into the 21st century.

For a new generation of construction professionals, technology isn't scary or off putting - it's exciting. This generation will likely end up being the industry's greatest transformational asset, and it is going to be absolutely critical to create a culture of innovation that's attractive to them.

Recruiting and retaining the best and brightest doesn't have to be an exercise strictly based in salary negotiations anymore. There is an opportunity to build a bridge from the best of construction's tried-and-true methods to a new and innovative way of doing things.

" The most exciting part about working in construction today is that the technology is finally becoming as dynamic as the rest of the industry. We're finally creating systems that can leverage data and help us become more efficient in our delivery, and we're doing it at scale."

Roman Baran, Project Manager, System Development

05.3 Personal productivity imperative: remove the pain of endless admin and help project teams focus on the stimulating, challenging and exciting parts of their job

There's a concept called **"nonlinear development"**[12] that describes the strategy of developing skills which complement your greatest strengths rather than focusing on shoring up weaknesses. For example, an olympic sprinter would not spend the off-season focused on long-distance running because it would actually weaken her core strength. Instead, she might focus on weight training to improve her explosiveness.

Similarly, it would be a mistake for construction teams to try to focus on improving their capability to collect, process and analyse data. Those efforts could actually detract and distract from a focus on developing and enhancing their core strengths. Instead, it's wisest to offload those parts of the job to firms whose entire focus is on improving them.

Project leaders are problem solvers, communicators and critical thinkers, people who can think fast and make good decisions confidently, even with limited information. Give them an opportunity to stop worrying about their weaknesses and to double down on their strengths.

The key to freeing up valuable human time is to be honest with ourselves about what the people in this industry are good at, what they're bad at, what they enjoy and what they don't. The imperative is to offload, automate and eliminate admin where possible, and give people the opportunity to double down on their strengths.

Rather than sending people to project sites with notepads to manually record progress and look for potential snags, use technology and specialised processes to handle the critical data processing that's required for a modern building project.

FOCUS ON

Freeing up people to do their best work

Canary Wharf Contractors & Disperse

In 2018, Canary Wharf Contractors took a new approach to solving productivity challenges. The team selected Disperse to standardise, stabilise and automate progress measurement and output analysis on complex residential builds.

By 2019, Disperse had become a core component of CWC's delivery strategy. Teams stopped spending half of the week walking sites and taking thousands of photos to be catalogued. CWC finally had a "view of the horizon" across projects.

In 2020, the two firms jointly validated a 25x return on investment against Disperse's pricing, with estimated average weekly time savings of 42.5% across the team. They have been nominated for several awards honouring their work together.

05.4
How to evaluate the best building productivity solution for your business

There's a lot of value being lost in construction's productivity gap and a lot of money to be made in solving it. That's why so many companies are trying to solve it and why there are so many products out there which claim to do so.

From a buyer's perspective, there are several factors which make it a fraught choice. One, it's hard to know exactly how effective a new solution can be. Two, operations are so tightly wound that there's little room for trial and error - nobody wants to buy something which turns out to be ineffective at best or actively detrimental at worst.

Those concerns are real and very valid: while efforts to solve this gap have been going on for some time, the technology to do so has only recently become viable. As such, there are a lot of new players and new products and not much in the way of history.

But by now we do have enough information to be able to make an educated decision. We know the problems which need to be solved, the benefits of solving them and what a solution might look like.

On top of that, to help refine our choice, it can be helpful to consider the needs and capabilities of the different departments within your company.

Because project teams are so busy executing, they have little time to spend on exploring new concepts. They are also reluctant to take risks which might result in dramatic disruptions to ongoing processes.

> **So the central business unit takes on the initial responsibility of sourcing and assessing possible solutions. The project teams should trust the folks at HQ to bear their needs and pressures in mind when making their evaluations. Ultimately, if a solution solves one department's problem by placing extra pressure on another, it's not a solution at all.**

Feedback from project teams is invaluable when a new solution is being trialled - if it slows them down too much or presents an unreasonable level of difficulty, the solution will fail the test. And, while the central business unit has to be aware of commercial realities which make short-term value delivery a necessity, they should also evaluate solutions' capability to enhance the entire business operation by improving everyone's long-term capacities.

Be aware that the best project teams for trialling the new solution should be forward-thinking and willing to fully engage with it. Even with the best of intentions an overly-reluctant team will make any new solution look inefficient.

There's an immediate productivity gain to be made by lowering the amount of input required while raising the amount of output achieved. If a solution requires an increase in human time or effort on the input side, it isn't going to provide more than a marginal productivity benefit.

At the project delivery level (construction managers, package managers, etc), any building productivity solution should reduce the amount of man-hours spent on administration and inputting information.

Be aware though that, to date, there is no solution in this area which is 100% fully automated - any which claim to be should be treated with skepticism. Right now, the human element remains necessary in order to calibrate the system and ensure value delivery. The early stage of onboarding a new solution involves spending some time logging and understanding your processes.

> **Look to partner with a team that has a track record of successful delivery, can provide testimonials from companies you know and is already embedded in the construction industry.**

FOCUS ON

Choosing the right long-term tech partners to elevate productivity

Canary Wharf Contractors & Disperse

Canary Wharf Contractors knew that working with a startup came with a certain degree of risk. Technology, after all, has not always lived up to its potential in construction.

Deliverables weren't always perfect at first, but CWC recognised in Disperse the makings of a good long-term partner. They saw a team that was excited to build real solutions, deeply empathetic to the industry, and as fearless about technology as CWC is about building.

CWC trusted the process, but they were never afraid to challenge the data and help shape the next iteration of the Disperse product. Two years, several awards nominations and many projects later, CWC and Disperse are a real example of how builders and technologists should work together by mixing tech savvy with field expertise.

06

A system for building productivity with Disperse

"Employing Disperse has introduced unquestionable truth to my project delivery. This has removed the grey typically incurred through substandard record keeping and has enabled our construction teams to reinvest increased capacities in dealing with the human to human resolutions and guiding production."

Liam Florey, Project Director

At Disperse, our system goes beyond as-built records: we extract progress data from images using a combination of computer vision algorithms and expert human quality assurance. We generate weekly reports from the extracted information and integrate that reporting into existing project management tools.

Our approach has six clear phases which are expert-guided and assisted by advanced technology:

- → **Configure**
- → **Capture**
- → **Analyse**
- → **Integrate**
- → **Calibrate**
- → **Automate**

Capture

Disperse 360°
Site Scanning

Drawings
& Programme

Existing Tools
& Software

Analyse + Calibrate

Object & Data
Analysis

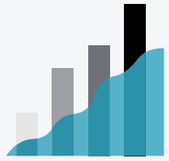
QA by specialists

Automate

Remote site access

Weekly progress
& quality reports

Automated Issue
Detection



Management
Dashboaard

Configure + Integrate

01. CONFIGURE

We work with your team to align our system with your existing systems. Our system ingests your programme, drawings and models to align with your processes. Configuration is a bespoke and precision exercise to ensure proper data quality, and value-alignment with your team's goals.

02. CAPTURE

To close the loop between planned versus actual progress and capture the site visually, a Disperse site scanner (or someone from your team) walks the site once a week with a 360° camera to take weekly high-resolution images of the whole project. These images create a "digital twin" of the site that is virtually navigable and layered over time, and which is linked to the project drawings, programme and sign-off data.

03. ANALYSE

Machine learning algorithms and human experts analyse images; the AI-plus-human hybrid approach provides the data quality assurance that is required. The seamless integration of visuals and reporting means that teams can accomplish both top-down (deductive) and bottom-up (inductive) analysis. High-resolution images give teams the capability to prove or disprove hypotheses and settle claims instantly, while high-level reports and notifications about potential snags serve to proactively expose problems before they do greater damage.

04. INTEGRATE

High-quality data, reports and notifications are delivered seamlessly to your teams. Our outputs integrate with your workflows, business tools and dashboards.

05. CALIBRATE

Over time, we work with your project teams to understand their specific needs, and we guarantee a hands-on approach. If something doesn't look right on the first pass, you can trust that we'll be able to calibrate the system to account for the uniqueness of your projects.

06. AUTOMATE

Once the system is set up, the process whereby data is captured, analysed and delivered to tools runs in the background, as though your project reporting is on "autopilot". The upgraded measurement and reporting functionality becomes a constant within a project feedback cycle. Data is not dependent on any input from your project teams and actually serves to remove stress points from the project team.

07

Closing thoughts

If the challenges, focuses and imperatives outlined above all make sense to you - good. You're in good company, and it's time to take the first step into building productivity.

Three years ago we set out on a mission to help the leading construction companies develop realistic solutions to real-world problems, and today we're leading the charge on rethinking and elevating building productivity by way of our purpose-built system.

We are technologists, but first and foremost we are builders; our CEO and founder, Felix Neufeld, grew up on construction sites in a big family of builders. For more than a decade he has believed in a vision of what a brighter future could look like for the building industry.

Felix's vision became our journey, and along the way he pulled onboard some of the best and brightest in fields like artificial intelligence, construction, architecture, data processing and business strategy. Today we're a team of more than a hundred, backed by Northzone, one of the top venture capital firms globally.

We are on a mission to holistically address the industry's biggest and most complex challenges at their common core. Our approach has been developed in conjunction with leading large-scale builders, and has been field tested on some of Europe and North America's biggest and most ambitious building projects. We have validated double-digit returns on investment from using our approach, and value is usually achieved within weeks of deploying on a project.

Organisations who have embraced our building productivity system have freed up project teams so that they can add value in more satisfying and uniquely human ways.

Reductions in wasted time and rework create immediate productivity gains on every project, while the accurate record-keeping and information-sharing would massively reduce the kind of risks which result from planning errors, erroneous claims, design deviations and so on.

Without time wasted on overruns and rework, and a new level of precision and stability baked into processes, builders have the opportunity to take on more projects and thereby grow the company and its profits. These new projects would benefit from the same productivity gains, further enhancing the value of the time reclaimed by the adoption of this technology, and so on in a virtuous cycle.

Underpinning it all, staff are happier in their work, and find their roles more fulfilling. Productivity results from a contented, fully-engaged workforce.

GET IN TOUCH!

Thanks for taking the time to explore the new approach to building productivity. We hope that you found the perspective valuable, and we encourage you to visit our website www.disperse.io to learn more. If you're ready to take the next step and talk to a representative, please get in touch with us at contact@disperse.io or connect with us on LinkedIn.

Get in touch!

Happy building!

References

1 United Nations - Department of Economic and Social Affairs (2018). World Urbanization Prospects - Population Division. [online] un.org.
Available at: https://population.un.org/wup/ [Accessed 1 Nov. 2020].

2 Deloitte (2019). 2019 engineering and construction industry outlook. [online] Deloitte.
Available at: https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-2019-engineering-and-construction-industry-outlook.pdf

3 McKinsey & Company (2020). The next Normal in Construction: How Disruption Is Reshaping the World's Largest Ecosystem. [online] mckinsey.com.
Available at: https://www.mckinsey.com/~/media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/The%20next%20normal%20in%20construction/The-next-normal-in-construction.pdf [Accessed 10 Nov. 2020].

4 McKinsey & Company (2017). Reinventing construction through a productivity revolution. [online] mckinsey.com.
Available at: https://www.mckinsey.com/~/media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Reinventing%20construction%20through%20a%20productivity%20revolution/MGI-Reinventing-Construction-Executive-summary.pdf [Accessed 10 Nov. 2020].

5 McKinsey & Company (2017). Navigating the digital future: The disruption of capital projects | McKinsey. [online] www.mckinsey.com.
Available at: https://www.mckinsey.com/business-functions/operations/our-insights/navigating-the-digital-future-the-disruption-of-capital-projects [Accessed 10 Nov. 2020].

6 McKinsey & Company (2016). Imagining construction's digital future. [online] www.mckinsey.com.
Available at: https://www.mckinsey.com/~/media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Imagining%20constructions%20digital%20future/Imagining-constructions-digital-future.pdf [Accessed 10 Nov. 2020].

7 Navigant Construction ForumTM (2012). The Impact of Rework on Construction & Some Practical Remedies. [online] www.cmaanet.org.
Available at: https://www.cmaanet.org/sites/default/files/2018-04/IMPACT%20OF%20REWORK%20ON%20CONSTRUCTION.pdf [Accessed 2 Nov. 2020].

8 KPMG International (2019). Future-Ready Index: Leaders and followers in the engineering & construction industry. [online] KPMG International.
Available at: https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/04/global-construction-survey-2019.pdf [Accessed 1 Nov. 2020]

9 McKinsey & Company (2012). The social economy: Unlocking value and productivity through social technologies. [online] McKinsey & Company.
Available at: https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-social-economy [Accessed 10 Nov. 2020].

10 Cottrill Research (2013). Various Survey Statistics: Workers Spend Too Much Time Searching for Information – Cottrill Research, LLC. [online] www.cottrillresearch.com.
Available at: https://www.cottrillresearch.com/various-survey-statistics-workers-spend-too-much-time-searching-for-information/ [Accessed 12 Nov. 2020].

11 Thompson, S. (2017). What Makes Employees Feel Happiest at Work (It Isn't Salary). Inc.com. [online] 23 Oct.
Available at: https://www.inc.com/sonia-thompson/what-makes-employees-feel-happiest-at-work-it-isnt-salary.html [Accessed 10 Nov. 2020].

12 Zenger, J.H., Folkman, J. and Edinger, S. (2011). Making Yourself Indispensable. [online] Harvard Business Review.
Available at: https://hbr.org/2011/10/making-yourself-indispensable.