

Productivity for the digital age

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Viewing knowledge and
managerial work through a
lens for the 21st Century



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Why now is the time to act



Ever since the introduction of the **personal computer** in the 1980s, we have been living through dramatic technological change.

The **internet** arrived in the 1990s, then travelled in our hands after the launch of the **Blackberry**, then **i-phone**, in the 2000s

A 2008 Nature editorial introduced **big data** [1], before being exploited in the 2010s. The transformational technology of the current decade is almost certainly **Artificial Intelligence**.

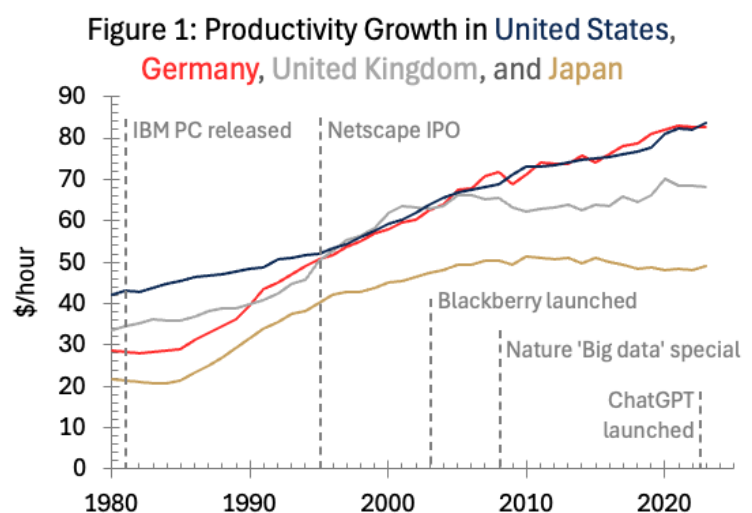
Each of these technologies should have signalled a step change in productivity. However at the start of the digital revolution, in 1987, the Nobel laureate Robert Solow quipped that, “*You can see the computer age everywhere but in the productivity statistics*”[2].

The mantra has stood the test of time.

The populations of Japan, Germany, and the UK have embraced the internet and mobile phones to similar levels [3].

If technology was the key driver of productivity¹, growth trajectories would be similar across these countries.

However the data shows a divergence. Productivity in Germany has continued to increase, whilst it has stagnated in Japan and the UK (figure 1²).



Looking beyond economic measures, there is evidence technology can have a paradoxical impact and make us less productive. Instead of gliding towards a 4-day working week, over three quarters of workers are reporting unmanageable workloads [6].

AI is now well and truly with us. Whilst there isn't consensus around the direction of its impact, there seems alignment that the impact will be large.

If we continue to implement technology without understanding its impact on knowledge and managerial work, we risk super-charging the work patterns that are making people feel over-worked.

If, however, we start to reimagine our work as a collective inter-dependent matrix of discrete tasks, and deploy digital tools purposefully, we can influence our systems to be more productive.

Then finally, we may see the benefits on our lives that these technologies should have enabled.

¹ Academic research has attempted, but not succeeded in finding, a clear cause for the Solow paradox [4].

² Data source – Our world in data [5]



What is included in this paper?

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The key steps

1

Recognise the four steps of the modern productivity paradox:

- New technology improves the productivity of one step in a process
- Production from that step increases
- Resources in the following steps are consumed processing the extra production
- The efficiency of the system drops

2

Examine work through a lens suitable for 21st century work

21CWorkLens has 4 main classifications:

- **Creating value by delivering for today's customer**
- **Creating value by investing for tomorrow's customer**
- **Waste** – Can be further categorised with the TIM WOODS mnemonic.
- **Management** – The functions of Planning, Organising, Influencing and Controlling that amplify value or waste

3

Re-engineer processes

It may not be practically possible to document and map changing processes. But thinking of the activity as a step in a process and asking these key questions can guard against the productivity paradox.

- What is the category of the activity?
- What impact does the activity have on the system?

4

Build a culture to support improving productivity and satisfaction

- **Be customer-focused** – It is the best antidote for silo-thinking, where local optimisation can inadvertently create cross-organisational productivity paradoxes.
- **Model the approach with language** – Thoughts and actions are revealed through communication. Hearing the terms in conversations indicates the ideas are alive.
- **Be broadly right, not precisely wrong** – The goal is improving productivity and satisfaction for your teams, not intellectual perfection.

1 Recognising the modern Productivity Paradox

The modern productivity paradox results when:

- **New technology** improves the productivity of one step in a process
- **Production** from that step **increases**
- Resources in the following steps are consumed **processing the extra production**
- The **efficiency** of the system **drops**

Yesterday's mail example – Carbon Copy

Prior to email, a copy of a letter or memo was created by placing alternating sheets of carbon and writing paper. 'Carbon copies' were created when the pressure of the pen or typewriter pushed against the carbon paper and a deposit of carbon left on the writing paper. Recipients of copies were listed at the end of the memo, after the notation 'Cc:'.

Creating carbon copies was difficult (papers had to be held together), and limited (typically 4-8 copies could be reliably produced). With the **new technology** of email, creating 'carbon copies' became easy and essentially unlimited, and the volume of copied messages has **increased**.

For many, work has become a battle to **process the extra** messages arriving in their inbox.

They are forced into one of three choices that indicate a **decrease in overall efficiency**:

- (1) Spend more time reading and processing internal emails, and less time on the core value-creating elements of their role.
- (2) Work more hours to fully process the emails and complete their main work tasks.
- (3) Admit defeat, and leave messages unread³

Today's example – Artificial Intelligence

AI is a **new technology** that **increases** the rate at which people can **produce** emails and other work. One study found AI super-charged time spent on email, and reduced the time spent on the focused, uninterrupted work that is likely to create value [8].

'Workslop' is a term that has followed AI into the business vocabulary. Workslop is AI-created and superficially seems to meet quality standards. But because it is lacking in critical thinking, the **receiver spends more time** assuring standards are met [9].

These examples of the productivity paradox are likely contributors to the findings that AI increased feelings of 'brain-fry' [10], and a disconnect between senior leaders and individual contributors on the productivity improvements [11].

³ Popular authors claim that 1/3 of emails that require attention are unread [7].



2 Examine work through a lens suitable for 21st century work

In the 20th century, many companies competed through large, capital-intensive projects delivered in infrequent cycles.

For example, **the Ford Mondeo was launched in 1993 and went through five upgrades across 30 years before production stopped in 2022.** In this environment success was achieved by understanding every discrete work activity and continually improving them to produce a smooth flow of cars from their constituent parts to the customer.

Material changes to the assembly line occurred about twice a decade when the model was upgraded.

Digital technologies introduced as the 21st century dawned has led to an evolution in the way we work. By 2001 more than half of the US labour force used a computer at work [12]. Alongside this revolution, the rate at which products are upgraded and released has increased.

The i-phone was launched less than 20 years ago but the seventeenth generation will soon be released.

An evolution is needed in the way work is seen and managed to match how it has evolved from the 20th to the 21st century.

This paper builds on the lean framework developed in the latter stages of the 20th century and looking at work through a lens relevant for the 21st century – the 21CWorkLens.

Using this lens to understand the nature of work, can help eliminate the ‘busy work’ that consumes resources without significant benefit. The saved time can be directed to productive work, or reset people’s work-life balance.

The 21CWorkLens has 4 high-level categories:

- A. Creating Value by Delivering for Today’s Customer
- B. Creating Value by Investing for Tomorrow’s Customer
- C. Waste
- D. Management

A. Creating Value by Delivering for Today's Customers

The goal of lean is profit maximisation [13]. To achieve this goal, it is necessary to be clear about 'what the customer is willing to pay for', summarised by the word **value**.

If your company makes products, you are likely only creating value and delivering for today's customer if you are changing the raw material on its journey into the finished product.

If your company sells software, you are likely only creating value and delivering for today's customer if you are upgrading or releasing the source code on which the software operates.

Whilst we recommend a narrow definition for value, we recommend a broader definition for customer that includes other entities involved in the end-to-end value chain⁴.

B. Creating Value by Investing for Tomorrow's Customer

A popular business mantra is: *"If you are not moving forwards, you are moving backwards"*.

It compels companies to invest into research, development, and capability to remain relevant and competitive. These activities don't generate short-term profit, but they create **value** by laying the foundations for new products, services, and future profits.

Activities that create value for tomorrow's customer include:

- **Growing skills**, through:
 - Training and development of current employees.
 - Hiring individuals with skills that are not present in the organisation
- **Growing capacity**
 - Hiring individuals resulting in a headcount increase
- **Growing ideas**, through:
 - Research and development
 - Running experiments, such as A/B testing
 - Reading and watching relevant YouTube content

C. Waste

Waste is the term used to describe work that consumes resources without creating value for the customer, sometimes called 'busy work'.

The inventory of unfinished work between assembly line workstations is a manufacturing example. The materials represent consumed resources that have not found their way to the paying customer. If those resources hadn't been consumed, profits would be higher.

Table 1 provides example wastes in physical processes, and extensions to computer-based work common in the 21st century. The mnemonic with a common-sounding English name, TIM WOODS, was created to help people remember different categories of waste, then identify them in processes.

⁴ See page 19: Discussion and background / Defining the customer

Table 1. Waste categories with examples

Travel – *Unnecessary movement between locations*

Traditional Physical Wastes:

- Moving materials between locations
- Walking to meeting rooms

21CWorkLens Extensions:

- Downloading/uploading data
- Sending files between workers

Inventory – *Raw materials or work in progress is not currently being worked on*

Traditional Physical Wastes:

- Raw materials received, but not yet being used
- Unfinished products between workstations

21CWorkLens Extensions:

- Project Work in Progress
- Request queues
- Unprocessed emails
- Open windows/browser tabs

Motion – *Movement within a workspace*

Traditional Physical Wastes:

- Picking items out of a box
- Reaching to attach an item to the product

21CWorkLens Extensions:

- Typing
- Mouse-clicks

Waiting – *Idle time before items arrive*

Traditional Physical Wastes:

- Machines not operating during changeovers
- Workers waiting for materials to arrive

21CWorkLens Extensions:

- Context switching
- Unproductive meetings

Over-Processing – *Processing to a higher standard than the customer requires*

Traditional Physical Wastes:

- Polishing a component that will never be seen
- Using materials that are stronger/lighter than the application requires

21CWorkLens Extensions:

- Unused software features
- Word-smithed emails
- False precision in KPIs

Over-Production – *Work completed before the customer wants, or is identified*

Traditional Physical Wastes:

- Completed product without a customer order

21CWorkLens Extensions:

- Delivering reports ahead of schedule

Defects – *Items that need correcting*

Traditional Physical Wastes:

- A metal weld with a discontinuity
- Missing part
- Incorrect labelling

21CWorkLens Extensions:

- Code bug
- Misunderstanding from an email

Shrinkage⁵ – *Loss of product or capability*

Traditional Physical Wastes:

- Stolen product
- Spoiled inventory
- Inventory passed its use-by date

21CWorkLens Extensions:

- Loss of talent through attrition to a competitor

⁵ The letter S traditionally stands for Skills underutilisation. See page 20: Discussion and background / Redefining the '8th waste' to Shrinkage



D. Management

Management activities are distinct, but not isolated, from those that create value or are wasteful. Management is an amplifier of other activities.

- Good management increases value and reduces waste.
- Poor management reduces value and increases waste.

Many workers are wholly, or nearly wholly, dedicated to management activities. The powerful effect of management on an organisation means that managerial positions are ideal for those whose purpose includes maximising their impact.

There are 4 functions in contemporary management theory [14]:

- i. Planning
- ii. Organising
- iii. Influencing
- iv. Controlling

i. Planning - Determining objectives and deciding how to achieve them.

Context matters when planning how to achieve objectives. A planning approach may increase **value** in one context but increase **waste** in another.

For large capital construction projects, such as a hotel construction, planning is best performed before work starts. It is worth going into detail and identifying all dependencies between electrical, painting, and decorating teams.

A well-developed and followed plan will reduce the waste of people **waiting** to get access to the worksite.

A similar approach would not suit a software development team. It is hard to identify all dependencies, and the result would unlikely meet customer needs. Instead, an iterative, agile approach to planning is more appropriate.

Customer requirements for the software are captured in 'user-stories'. A backlog of user stories is continually created and updated based on feedback from real customers and users. Information is added to the user-stories so that they create the right level of detail just before the developer builds the feature.

This approach reduces the queue of requests (**inventory**) and increases the likelihood that developed features will be used (reducing **over-processing**).



ii. **Organising** - Arranging people, resources, and processes to execute the plan.

Organising is very closely related to planning - deciding who will do what. Done correctly, it increases **value**.

- If the company's best engineer is working in the research and development department, they will use their skills to develop the product and services that future customers will value.
- If the company's best engineer is placed on the assembly line their skills are under-utilised. The company incurs the **opportunity cost** of not developing products for tomorrow's customer. The engineer's skills may not match the needs of the assembly line. They may more often mis-fit parts, increasing **defects** to be corrected later or the number of assembly line stops.

New technologies have changed the way companies organise and coordinate. Email is an example that has created a productivity paradox⁶.

People use email and instant messaging services to ask others to carry out tasks. It can lead to a negative work pattern where people get consumed by a cycle of busy work. Wastes can grow – **motion** of typing and mouse-clicks, **travel** of email between hard drives through servers, and an **inventory** of unread emails.

A compelling articulation of the problem is provided by a contributor to Cal Newport's book 'A World Without Email'

"...the number of these requests spiraled out of control. I frantically try to grab other people's time and attention to make up for the time and attention they've already grabbed from me" [16].

iii. **Influencing**⁷ - Motivating, communicating with, and guiding people.

Influencing is critical for businesses and teams.

Teammates going for a coffee builds connection and trust. These bonds are leveraged when a critical issue develops that affects the business. They quickly come together to resolve the issue and get **value creation** back on track.

Going for coffee can also increase waste. Exclusive 'coffee clubs' form cliques and can create mistrust to harm team performance.

Too many coffees lead to sitting around and idle chat, fundamentally **waiting** to do work... An activity no customer wants to pay for.

⁶ A complementary white paper has been written that applies the 21CWorkLens to email [15].

⁷ The management function of influencing is also referred to as leading. The word influencing is selected over leading as it is more inclusive on two dimensions. Firstly, it does not limit who the word applies to – one way of defining a leader is someone who has followers, which be a barrier to individual contributors recognising activities in this function. Secondly, leading can be considered as an outcoming of successful influencing. If you influence people well, they become your follower.



On an organisational level, a leader's all-hands speech can have different outcomes:

- An inspirational speech at an all-hands meeting can motivate and focus the team to **create value** for today and tomorrow's customers.
- A poor delivered speech about the company's future could lead to job security concerns. Anxious workers may be less productive. They may be unable to concentrate and regularly **switch contexts** between tasks, news articles, and job boards.

Some company functions influence **externally**. Marketing teams influence the potential customers of today and tomorrow.

- Done well, they buy your product or service and you realise the **value** from your work.
- Poor brand management can create negative publicity causing sales can drop. Completed but unsold products will gather in the warehouse revealing the waste of **over-production**.

Influencing can extend to **stakeholders** who are not customers. Influenced well, local communities become ambassadors for the brand, increasing sales. They are a source of potential future employees for the company to grow capacity and **deliver for future customers**.

If local communities are not influenced effectively, protests at the company gate would result in resources being consumed and diverted from creating value.

iv. **Controlling** - Monitoring performance and taking corrective action when needed

A common physical controlling activity is quality inspection. The customer does not directly want to pay for the inspection, they just want the working product⁸.

- Done well, inspections find sub-standard items. Causes are investigated and the process improved to reduce the likelihood of future **defective** parts.
- Done poorly, **defective** parts make it to the customer.
- Unnecessary inspections increase **waiting** time for inspection and release to the next step.

Another physical example occurs frequently in hazardous industries. Managers devote time to controlling activities at the worksite to keep their teams safe. They perform risk assessments to identify hazards and develop actions and controls to reduce the likelihood of accidents, or limit their consequences.

Not all controlling activities require physical contact with the product.

Issuing and processing invoices control the amount of money changing hands so that they match agreements.

Managers monitor performance and develop corrective actions during weekly business reviews.

- Done well, actions lead to improved value creation and elimination of waste.
- If incorrect conclusions are drawn, actions won't lead to greater value.
- Poorly managed business reviews lead to people **waiting** to leave an uninspiring meeting.

⁸ In lean management, quality inspections are usually classified as necessary non-value add. See page 16: Discussion and background / Reframing 'Necessary Non-Value Add' as an element of 'Management'



3 Re-engineer processes

Process engineering is a tool used to improve performance in organisations. Leaders and organisations are recommending processes re-engineering to realise productivity benefits when introducing AI [6] [17].

Mapping the current situation is the first step to re-engineer a process. Each activity, decision, information flow, and handoff are visually represented in sequence. Next, each step is categorised as valuable, or wasteful, etc. Finally, the map is used to identify opportunities to simplify, standardize, or automate.

Formal mapping can be helpful when processes are stable and repeatable, but impossible for unstable or changing workflows. For example, it would not be possible to map **The Hyperactive Hive Mind** - a work process where distributed individuals collaborate in an unstructured way that utilises the collective, but undocumented knowledge and experience of the organisation [16].

Processes that change, and even the hyperactive hive mind, can be improved without formal mapping. Eliminating waste from individual steps can improve the overall process, but it can alternatively generate productivity paradoxes.

Two key questions provide guidance when re-engineering an ambiguous process:

1. What is the category of work being performed?
2. What is the impact of the output from the activity on the system?

1 What is the category of work being performed?

Every activity can be considered to fit into one of the four 21CWorkLens categories of: create value delivering today, create value investing for tomorrow, waste, or management.

If the activity is **waste** - stop doing it! If it isn't possible to just stop, investigate the reason the activity is generated and put in place actions to stop it at source.

If the activity **creates value for today or tomorrow's customer**, remain focused but don't be complacent. A valuable task likely a collection of individual steps, some of which will be wasteful and can be reduced or eliminated⁹. When there is time, investigate and experiment to find a faster, cheaper and lower cost way to complete the task.

If you are performing a **management** activity, recognise it for what it is and think of the next key question – what is its impact on the system?

⁹ Tasks can be categorized differently depending on the granularity at which it is examined. Zoomed out, writing this report is **creating value for future customers** – growing ideas. Zooming in reveals wasteful actions. The **motion** of typing more slowly than the brain, **defects** of mis-spellings, words that **travel** around the page when sentences are reordered and rewritten to (hopefully) make them easier to read.

2 What impact does the activity have on the system?

Valuable work isn't always valuable

Work that feels valuable can unknowingly create waste elsewhere in the system.

In a manufacturing context, creating car doors feels valuable. But without a car chassis waiting for doors, they form a pile of **inventory**. The inventory represents the production from resources before the materials were needed. Human resources could have been spent on alternative activities that generates profit more quickly. Material resources could have been purchased later.

In a similar manner, software features developed but neither tested or released to the customer form a virtual pile of **inventory**.

If you find excess physical or virtual inventory, waste can be reduced and flow of value to the customer increased by changing the signals that trigger work to be started.

Management always leads to more activity

All management tasks lead to more tasks. The resulting tasks may be valuable, waste, or further management. The effect may be small, a ripple, or large, a tidal wave.

Improving management productivity with technology can create productivity paradoxes.

A recent study identified that AI implementation is targeted towards management activities [6]. 16% of workers are redesigning workflows for executive reporting. The results from reporting more quickly to executives depend of the context and culture of the organisation.

- One outcome is that key information quickly makes it to a member of the C-suite. They make a decision that changes the trajectory of the company to create greater **value** and profit.
- An alternate outcome is that information revealing a problem quickly makes it to the C-suite. The executive sends a request to the front-line manager asking for more details about the situation, and the action plan to recover. Instead of working with their team to fix the problem, the local manager may be compelled to create status reports and provide updates to satisfy questions of the all the managers in the chain. The impact on the system is more typing, writing reports and management, and less time fixing the problem and a delay to creating value.

4 Build a culture

The tools and approaches in this paper can improve productivity of individuals, teams, or organisations. To succeed, they need to be implemented with the right culture.

There are three recommended principles that can help build a supportive culture:

1. Be customer-focused
2. Model the approach with language
3. Be broadly right, not precisely wrong

1 Be customer-focused

Focusing on the customer, and what they value, is the best way to identify value creation.

Without customer focus, two negative work patterns can evolve that are fertile breeding ground for cross-organisation productivity paradoxes.

- (1) **Silo thinking** – Thinking in silos risks optimising one part of the organisation to the detriment of another. A manager in one department may believe they have improved efficiency, but their increased production may be over-whelming another team. In the best case they may have moved the waste, in the worst case more waste is generated.
- (2) **Mistaking meta-work for value** – Bureaucracy and processes are necessary for organisations to function. These activities should always be in service of creating value. They can be described as meta-work, one step removed from the activities that create value. In some organisations power can aggregate within the bureaucratic structures. These organisations risk placing bureaucratic needs ahead of activities that create customer value.

2 Model the approach with language

Sharing this report and training are useful steps, but approaches will only embed if they are used in the language of leaders. Use phrases such as:

- *“How will your work amplify value creation?”*
- *“What are the wastes that could unknowingly result from your work? How could we eliminate or minimise them?”*

Hearing the phrases in the organisation’s language brings confidence that actions and behaviours support the goals.

3 Be broadly right, not precisely wrong¹⁰

Pragmatism beats perfectionism.

- Is the management activity **planning** or **organising**? Honestly, it is unlikely to matter. The important point is realising it is a management activity that should be in service of creating value. Management activities themselves are not inherently valuable as a standalone activity.
- Is a product for a downstream external client **inventory** or **over-production**? What matters is that resources have been used creating materials that doesn't yet have a customer. Both categories are a waste – minimising them will increase profits.

The sub-categories are there to help people identify the category and decide an action to become more productive. If your team spends time debating the sub-category, the debate has started to amplify waste, the opposite of the goal.

There may be situations where the model doesn't work¹¹, or feels too forced. Agree an imperfect compromise, and go with it. It will be worth it if it develops the habit of asking the right question, and protects your team from productivity paradoxes.

¹⁰ The phrase "*It is better to be roughly right than precisely wrong*" was popularised by John Maynard Keynes, but first documented by Carveth Read.

¹¹ The only scenario encountered to date that didn't fit the framework of this is a company offering management services. The customer is paying for the company to do 'organising' and 'controlling'. However, if the service provider focuses on increasing their revenue through increasing the number of management actions, and not the value from the task they are managing, the client may well start looking for a new management services provider.



Discussion and background

This section provides the context and bridge from established lean and agile practices.

The discussion is not meant to be negatively critical of earlier work. On the contrary, this work is only made possible by those who have come before. The changes are not revelational. They are evolutionary and incremental. They make small additions, re-frame ideas with the aim of supporting understanding communication, and make lean and agile approaches more widely applicable.

Inspiration

The inspiration for this work is Taiichi's Ohno Toyota Production System (TPS) [13]. Ohno was a key factor in Japanese car makers becoming leaders in the US automotive sector [18]. His approaches were expanded and morphed into a management philosophy known as lean [19].

The origin of this paper – Why is it needed?

A failed attempt to implement lean in a knowledge and managerial work environment led to the realisation that lean needed to be modified to become more scalable and widely applicable.

This paper describes the result of 2 years of modifying, testing and improving lean and agile approaches.

Reframing 'Necessary Non-Value Add' as an element of 'Management'

As TPS was transported to the west and morphed into lean, waste was broken down into two sub-categories [19]:

- Type 1: Non-value creating from the standpoint of the customer, but currently necessary to run the business
- Type 2: Non-value creating and unnecessary.

Type 1 waste became known as **Necessary Non-Value Add (NNVA)**. This paper recommends retiring the NNVA category and replacing it of **management** for 3 reasons:

1. Management is a more widely understood when compared to NNVA
2. Management helps people consider the interactions of their work with others in the system
3. 'Necessary non-value add' sounds contradictory

1 Management – a more human term

The term ‘necessary non-value add’ is not a commonly-used term. Additionally, it requires everyone in the conversation to have the same contextual understanding of the term value. The question “*Is what you are doing valuable, or necessary non-value add?*” is hard to translate and internalise for those not working in their preferred language

By contrast, the four functions of management (planning, organising, influencing and controlling) are common in everyday language. The following questions require less contextual knowledge and are more accessible for those who work in many languages:

- “Are you *delivering directly for the customer*, or **managing** others who are delivering for the customer?”
- “Are you **planning** and **organising** the work, or doing the work?”
- “Are you giving the customer what they want to pay for, or **influencing** them to make a future purchase?”

2 Considering management to be an amplifier

Interviewing provided a particular challenge during the failed attempt to ‘value stream map’ a team of knowledge workers. It provides a good case to examine how management activities relate to others.

Interviewing is classified as a **controlling** activity under the **management** category when viewed through the 21CWorkLens. It doesn’t inherently create customer value, but is carried out with the intention of hiring an employee who will create value.

Reasons to interview can be different.

- One is to satisfy a growing customer demand for product or service. Interviewing forms a **management** step with the aim of **growing the capacity** and capability of the organisation.
- An alternative is to replace a team member who regrettably left for a competitor. Rehiring and retraining could have prevented if the employee stayed, and repeating activities is a **waste**. Actions to prevent the **waste** reoccurring depend on why they left. If they left...:
 - ... for better pay, perform a market analysis to find out if pay is competitive.
 - ... for more flexible working, review the hybrid-working policy.
 - ... a new manager who had been recently promoted from individual contributor, review the new manager training offer.



Results from interviewing can have different impacts on the organisation:

- If the hiring process worked and the successful candidate **grew the capability** of the organisation, **value** has been created by investing for tomorrow's customer.
- A candidate failing probation indicates a problem in the process and will result in the **waste** of repeating the process six months later.

Looking more broadly, an accepted definition of management is: 'The process of reaching organizational goals by working with and through people and other organizational resources' [14]. This definition infers connection with other work.

Instead of being fully isolated from value and waste, management impacts other activities.

- Done well, organisational goals are met using resources efficiently to create value.
- Done poorly, organisational goals are missed when resources are wasted in unnecessary tasks.

This paper includes many examples of management activities interacting with others. Some are simple, and the interviewing example is complex. The robustness of the approach in the face of all of these examples demonstrates its scalability.

3 Removing the NNVA contradiction

Communication with the term NNVA can be confusing. For example:

- A manufacturing plant manager could tell his team at the start of the day that: *"Safety is job number 1, no work is so important that it can't be done safely"*.
- They may then walk into a process improvement session where the manager would declare to the same people that: *"Safety risk assessments required before work starts are necessary, but not value adding"*¹².

His team may well be confused by 'job number 1' having no value.

By contrast, one of the four functions of management is **controlling**. There is no contradiction if a manager were to say that: *"My most important job is keeping my team safe"*, then walk into a process improvement session and identify the step of performing a safety risk assessment as a management activity.

Managing safety has the management characteristic of creating value, or suffers from wastes:

- Done well, risk assessments keep people safe, and they continue to create **value**.
- Superficial risk assessments lead to increased likelihood of accidents and the costs associated with them.
- Over-zealous risk assessments create unnecessary paperwork and checks that lead to **waiting**.

¹² Customers do not pay directly for risk assessments that can keep workers safe. They pay for the product. Most customers have the reasonable expectation that no employee was hurt in the process.





Defining the customer

The customer is traditionally defined as the individual or organization that pays for a product or service. Broadening the definition of ‘customer’ to include stakeholders who sit in the extended value chain support value creation.

Government authorities (e.g. tax, regulatory, environmental agencies) may not buy a company’s product or service. They provide infrastructure, services, legal frameworks, and market stability the organisation needs to operate. In return, companies provide taxes, and statutory reporting (e.g. greenhouse gas emission disclosures). If these mandatory tasks are not completed the paying customer will not receive their product or service.

We caution against the term ‘**internal customer**’ for another department within an organisation. The terminology and associated mindset can create bottlenecks and amplify waste.

Delivering to an internal customer increases the volume of activities for them to work on. They can start work straight away and maintain the flow of value towards the customer if they have capacity. However, if they don’t have capacity, **inventory** will form. They can either:

- Work on a first in-first out basis, whilst the **inventory** continues to grow.
- Establish a process to **control** that the item they take from the inventory is the highest value. Resources will be required to complete value assessments. As the work pattern expands, resources are displaced from creating value to **managing** the work.
- Stop working on one of their current activities and start on the item that has just arrived. The **inventory** will be moved from between the teams, to the internal process of the downstream team. As formal work in progress for the team, it may be less visible, but will result in longer **waiting** by the customer for the item they were originally working on.

Seeing intangible activities

Identifying and classifying activities in manufacturing industries is completed by observing work. Activities that change the form of the product **add value**. Moving product from one place to another is a wasteful activity of **travel**.

Diagnosing activity as wasteful or valuable is more difficult in knowledge and managerial work where interaction with digital tools dominate. Managers who observe their team staring intently at Excel screens are likely to conclude the team is working productively.

- One team member may be creating **value**. They may be developing insights from data to delight customers in the future.
- Another worker may be consumed in **waste**. They may be moving data from two different databases for comparison, the digital equivalent of boxes **travelling** round the factory floor.

Without disturbing the team by asking them questions, or invading their personal space to look at their screen, it will be impossible for the manager to tell.



The challenge of diagnosing knowledge work was identified long ago. One detailed review agreed with the premise of this paper that eliminating waste in knowledge work requires adaptation of lean approaches [20]. Examples where researchers have attempted adaptation include: information management [21], enterprise resource planning systems [22] and specific use cases (e.g. emergency response [23]). Others conclude efforts to apply lean wastes to knowledge work are hindered by errors during translation and transposition from Japan to the west [24].

This approach differs in 3 respects:

1. Others focus on waste types. This approach additionally evolves the higher-level categories of value, necessary non-value add, and wastes.
2. Others tend towards increasing granularity and number of types of waste. This widens the definition for existing wastes for a simpler, more flexible, and scalable approach.
3. Some others aim to take lean back to its TPS roots. This work aims to build on both.

Redefining the ‘8th waste’ to Shrinkage

Ohno originally defined seven types of waste [13]. These were translated into English and manipulated into a mnemonic for a common name in English-speaking countries, TIM WOOD.

Later, an 8th waste was proposed to account for the under-utilisation of human capability [25]. It was termed **Skills-underutilisation** and appended to the mnemonic and preserve the similarly plausible English name, TIM WOODS¹³.

The 21CWorkLens positions skills-underutilisation as a negative outcome from the management function of organising. Better management would better utilise the human capability.

However, a waste not identified by Ohno can be represented with an alternative letter **S**. Examples are:

- Inventory passed its use-by date, particularly food, can be described as **spoiled**. Spoiled inventory is disposed, **shrinking** the total amount.
- **Stealing** is unauthorised removal of inventory by staff and customers, and **shrinkage** in the retail industry.
- If your engineer resigns to join a competitor, the capability and capacity in your organisation is smaller, or has **shrunk**.

The 21CWorkLens preserves the TIM WOODS mnemonic and defines an alternate 8th waste: **Shrinkage** – the loss of product or capability.

¹³ An alternative approach translates of the wastes slightly differently to form something factories want to eliminate – DOWNTIME (Defects, Over-production, Waiting, Non-utilised talent, Travel, Inventory, Motion, Extra-processing).

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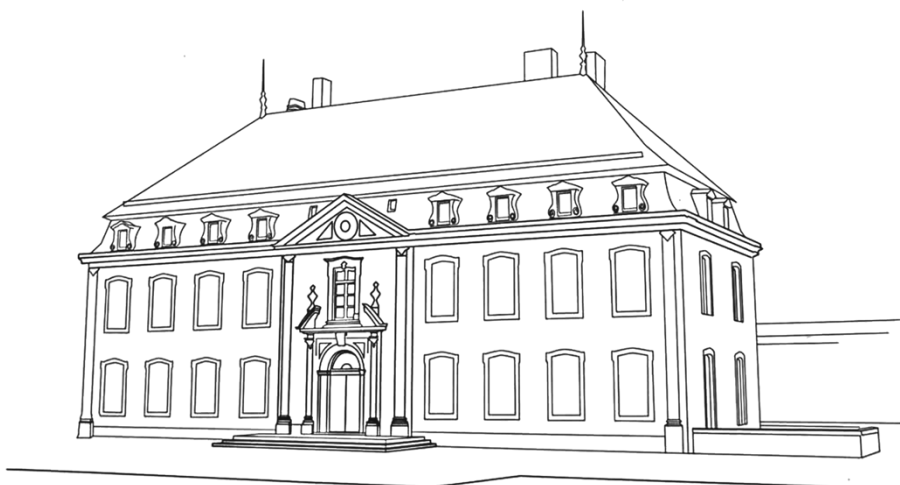
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