

Evaluation of M4 Sydhavn

External evaluation carried out by Implement Consulting Group for Metroselskabet I/S
(The Copenhagen Metro)

February 2025



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for

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Executive summary

Key points regarding critical success factors in the M4 Sydhavn project that enabled delivery within the agreed time and budget and with the desired benefits.



Trust-based collaboration

- From the outset, the Sydhavn project was characterised by a strong culture of collaboration with common goals, bold ambitions and a sense of shared pride in the project.
- Solid technical expertise displayed by both the client and contractors combined with an understanding of the counterparty's commercial interests.
- The Copenhagen Metro has worked actively to build trust between the company and its partners. Throughout the project, the parties have taken on more tasks and greater responsibilities than they were contractually obliged to.
- The trust has been established through credibility, reliability and confidentiality, combined with transparency about own interests.



Flexible and solution-oriented

- The Copenhagen Metro has pursued an agile project management approach, ensuring balanced control and flexibility throughout the project. Among other things, the company has engaged in active contract management, with financial agreements concerning changes or discrepancies being made on an ongoing basis.
- Being flexible and solution-oriented has been crucial to ensuring progress during unforeseen events, including during the covid-19 pandemic and the global supply chain crisis, where the company and the authorities assisted the contractor with measures (covid-testing facilities, material procurement etc.) to ensure progress.
- Good relations between the client, contractors, operators and political stakeholders have ensured sufficient flexibility to arrive at the right solutions, with all stakeholders displaying flexibility. In addition, the authorities have been proactive to ensure progress.
- The Copenhagen Metro has succeeded in creating flexibility for the project by communicating the opening time as a year rather than a particular date.



Experience and competences

- By drawing on experience from M3 and M4 Nordhavn, The Copenhagen Metro has reaped the benefits of being a client with experience from multiple similar projects and with a steady pipeline of projects coming in.
- A thorough analysis phase has ensured realistic and robust planning, enabling efficient execution in the construction phase.
- Using standardised solutions has reduced complexity and risks.
- A competent team as well as experienced owners and authorities have created a clear framework and optimum regulatory approvals for the project.



Company structure and incentives

- The Copenhagen Metro's framework conditions in the form of full responsibility for design, construction and operation ensure a clear purpose: Timely completion of the project so that debt can be repaid through passenger revenue.
- The Board had a mandate to make all decisions within the allocated budget, ensuring progress.
- A strong commercial focus on passenger influx has supported the purpose.
- By working both with common goals and with the individual goals of the company and the owners, incentives were ensured for all parties.



Management and governance

- An effective governance structure with clearly defined roles and responsibilities has ensured project progress. Based on its in-house competences, the company has assumed control and ensured quick and coherent decision-making.
- Key persons were authorised to make necessary decisions without unnecessary escalation, ensuring that issues were resolved at the level at which they arose.
- Collaboration with contractors and the authorities has been characterised by clear points of contact, resulting in effective communication.
- The company's relatively small, agile, flat matrix organisation enabled rapid response to challenges and solution-oriented actions.
- Continuous reporting to the Board and owners on finances, progress and risks created transparency while enabling close cooperation in critical situations.



05	Introduction and background
08	Theme 1: Trust-based collaboration
16	Theme 2: Flexible and solution-oriented
22	Theme 3: Experience and competences
30	Theme 4: Company structure and incentives
37	Theme 5: Management and governance
45	Appendices

The expansion of the Copenhagen Metro with the M4 Sydhavn line opened on time on 22 June 2024, and was completed within the established budget (including adjustment reserve K2-A, cf. the principles for New Construction Budgeting under the Danish Ministry of Transport). In addition, passenger numbers at the five new stations have been more than twice as high as budgeted during the start-up phase.

All these goals were achieved despite the fact that the covid-19 pandemic struck during the actual construction phase, leading to challenges in bringing foreign labour to Denmark as well as challenges with the supply chains for the materials.

In addition to the three elements – time, finances and benefits – which are the classic success criteria for project implementation, the M4 Sydhavn project was also carried out with a relatively low degree of occupational accidents. The accident frequency (number of accidents per one million working hours) was thus 7.8 for the M4 Sydhavn project. By comparison, the accident frequency was 19.8 for the M3 construction project. The average for the building and construction industry is 31.2 (Confederation of Danish Employers (DA) – Accident statistics). In other words, this reflects successful attempts to promote safety at all the project's construction sites.

The M4 Sydhavn project can be described as a megaproject, and we know from research that very few megaprojects succeed in delivering on all the aforementioned success criteria (Flyvbjerg & Gardner (2023), Vyas & Zweifel (2022)). It is therefore interesting to identify

the critical success factors that have made this possible. In this way, the learnings and experiences can serve as inspiration for future major construction projects.

The Copenhagen Metro has therefore asked Implement Consulting Group to carry out an external evaluation of the M4 Sydhavn project to identify the critical success factors.

Background

The Copenhagen Metro opened on 19 October 2002 with the M1 and M2 lines. The M3 line opened in 2019 and, most recently, the M4 Nordhavn and M4 Sydhavn lines opened in 2020 and 2024, respectively (see map of the Metro in Appendix 1).

The basis for M4 Sydhavn is the political 'Agreement in principle on a metro to Ny Ellebjerg via Sydhavn and the expansion of Nordhavn' between the Danish State and the City of Copenhagen of 27 June 2014. The political agreement was translated into the 'Act to amend the Cityring Act and the Act on Metroselskabet I/S and Udviklingselskabet By & Havn I/S' of 18 February 2015, which provided the legal basis for the establishment of M4 Sydhavn. In connection with the tender process, in particular the discussions with the tendering contractors, it was stipulated that M4 Sydhavn should open in mid-2024, which was approved by the owners (the Danish State, the City of Copenhagen and the City of Frederiksberg) in November 2017.

Purpose

The purpose of evaluating M4 Sydhavn is to identify the critical success factors that enabled the project to be delivered on time, within budget and with the desired benefits (the elements of the project triangle). The evaluation thus looks at the M4 Sydhavn construction project, and at what the main internal and external stakeholders saw as the reasons for the project's success.

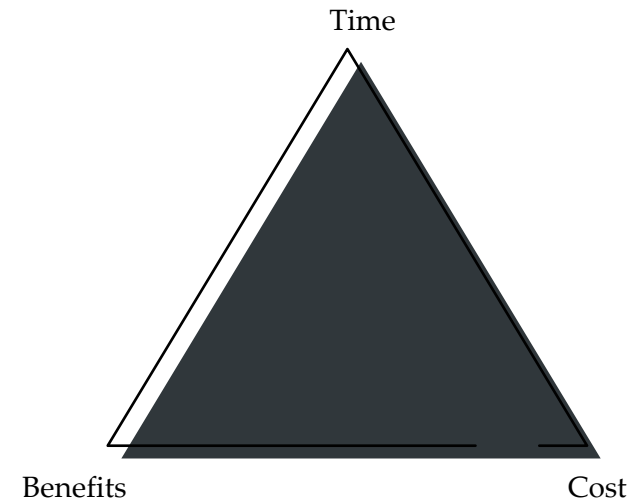
Data material

The data material consists of interviews with 12 key stakeholders from The Copenhagen Metro and 10 key stakeholders representing the owners, authorities, suppliers and consultants. All the data material has been handled in confidence, and is presented in anonymised format. The data material consists of saturated data, which has shown a high degree of consensus on the critical success factors among the internal and external stakeholders. The key points identified by the evaluation are thus the result of 22 key stakeholders' relatively similar experiences of the reasons for the project's success.

The data material also consists of publicly available documents such as quarterly and financial reporting, legal frameworks, political agreements and materials for the owners.

Method

The evaluation began with a workshop with key stakeholders from The Copenhagen Metro. The purpose was to develop hypotheses for how the project's success criteria were achieved. The hypotheses then formed the basis for a questionnaire, which was used in the subsequent semi-structured interviews. The written data material has been used to validate statements made during the interviews, and the documentation has been used to validate whether the project has actually delivered on the project triangle's success criteria.



Analysis

The collected data material has been analysed with reference to the purpose of the evaluation. In connection with the analysis, a number of themes were identified, which together map the project's critical success factors. The themes and their supporting central points were then presented and validated at a workshop with The Copenhagen Metro. This resulted in five main themes:

1. Trust-based collaboration
2. Flexible and solution-oriented
3. Experience and competences
4. Company structure and incentives
5. Management and governance

Perspectives

As mentioned earlier, an important purpose of the evaluation is that experiences and observations can be used in the planning and implementation of future megaprojects. Where relevant, we have therefore looked at our findings from the analysis in the light of the research literature as well as the methods and tools that have been documented as having an impact when implementing large, complex projects – for example Half Double.

Half Double has been developed by the Danish Industry Foundation, Aarhus University and Implement Consulting Group. The method has been tested and validated through various projects in different industries and project types. The Half Double methodology combines classic project management methodologies with new and agile methodologies and focuses on three core elements: Impact, flow and leadership. These elements are supported by concrete methods and tools. In evaluating the M4 Sydhavn project, it has been shown that a number of the initiatives that have contributed to the project's success also can be found as methods and tools in the Half Double method. Therefore, references will regularly be made to this methodology.





Trust-based collaboration

Theme 1

Theme 1

Trust-based collaboration

A consistent success factor pointed out by almost all the interviewees in this evaluation is the positive collaboration and the high degree of trust between the parties in the M4 Sydhavn project.

A high degree of trust can be difficult to achieve in large projects, as the parties involved often start out having different interests.

The business case for The Copenhagen Metro was that M4 Sydhavn should be delivered on time and within budget, so that the expected passenger numbers could be realised, ultimately ensuring that the company could live up to its long-term budget.

The business case for the contractors was based on their earnings from the contract, while for the owners there were political objectives, such as ensuring good mobility in the Greater Copenhagen area with a new traffic hub at København Syd station as well as promoting the urban development of the Sydhavn area.

At the start of the project, meetings were held between the management of The Copenhagen Metro and the contractors, and considerable time was spent discussing the interests of the various stakeholders. The purpose was to articulate and create transparency around the topic, so that they could then agree on a common goal: That the project should be delivered on time.

Subsequently, the stakeholders demonstrated a willingness to make decisions that did not necessarily support their own interests, but instead promoted the project's common goals.



Common goals through building trust

According to the Half Double methodology, one of the project owner's most important tasks is formulating a shared vision for the project with clear goals. One reason why a common goal was successfully created is that the various stakeholders felt a sense of pride in working on such a large project, one which is markedly changing mobility in the Danish capital. As one interviewee puts it:

"I really like doing large projects. With large projects, you have a huge organisation working towards a common goal – and that's great."

- Key stakeholder at The Copenhagen Metro

The shared vision resulted in common solutions being found to challenges that arose. As one of the interviewees puts it:

"There was a real sense of commitment from the team, and they focused on the goal. The common goal of delivering on time. We always found a solution to any challenges. Always."

- Key stakeholder from the owners/authorities/suppliers/consultants

A crucial prerequisite for establishing a collaborative culture with a common goal is the building of trust in the project, especially at management level. As one of the interviewees puts it:

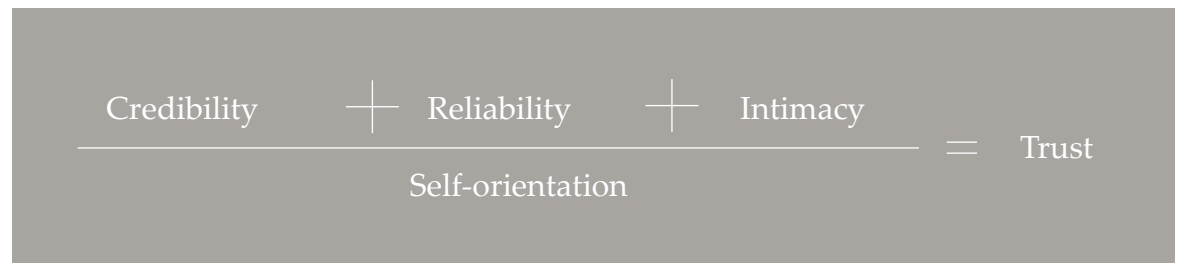
"You can't decree that everyone has to work together. Trust must be built. If no relationship exists, then you have to devote a lot of energy to building it."

- Key stakeholder at The Copenhagen Metro

The prerequisites for gaining trust with another party are set out in the so-called 'trust equation' (Maister et al., 2000). Gaining trust requires that you:

- demonstrate the necessary expertise to solve a given task (credibility)
- act in accordance with your promises (reliability)
- make people feel safe (intimacy)
- minimise the focus on your own goals (self-orientation).

In the M4 Sydhavn project, many specific actions contributed to building trust between the various players.



Credibility

The interviewees often mentioned that the other parties in the project had a lot of expertise in constructing metro systems. The client organisation had in-depth expertise and extensive experience from the construction of the Metro in Copenhagen (see theme 3), and about the project's leading figures, especially a very key person in the client organisation, it was said that:

“Without withholding delays or problems, we presented our challenges to him, and then we found a solution without any finger-pointing from The Copenhagen Metro.”

- Key stakeholder from the owners/authorities/suppliers/consultants

The following was also said about the same key person:

“He has a solid technical background. He was part of the solutions. He took part in the discussions, and played a role in the technical decisions. He was not in any way distant from the site or from the design solutions. This made a huge difference.”

- Key stakeholder at The Copenhagen Metro

The dialogue between the client, contractors, consultants and authorities was characterised by enduring respect for professional competences. This respect was strengthened by previous experience, as many of the parties involved had also worked on previous Metro projects (M1, M2, M3 and M4 Nordhavn). The credibility was further supported by the fact that contractors and advisors felt that their proposed solutions were taken seriously, and that they worked under the principle of ‘freedom with responsibility’. This gave them the freedom to plan their work and propose solutions, as long as they adhered to the project's overall criteria. As one of the interviewees said:

“It's freedom with responsibility. As long as you deliver, that's fine. If you don't deliver, you'll be told, and then it may be that the reins are tightened a bit. An atmosphere of trust was created for all. If everything is very formal, then you can be more contractual. That was not the case, but all the contractual requirements were obviously in place.”

- Key stakeholder from the owners/authorities/suppliers/consultants

Reliability

Reliability was demonstrated by the parties doing what they said they would. This was evident in a number of ways.

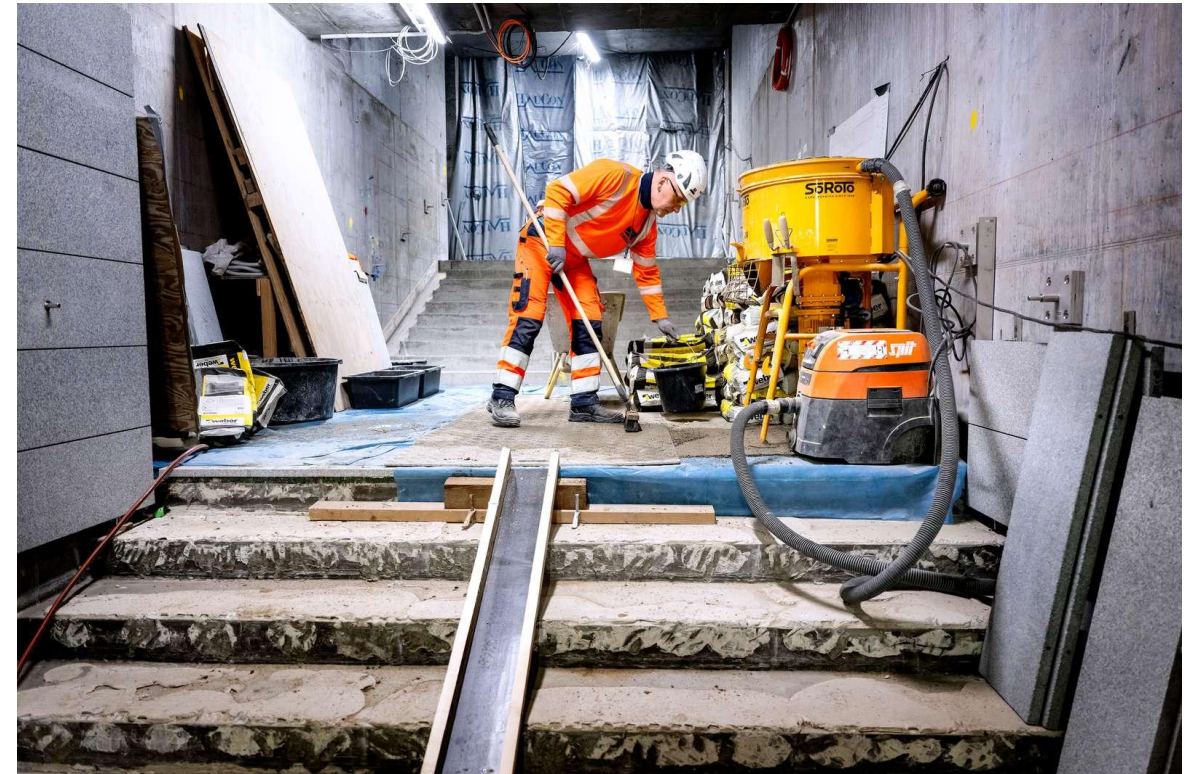
When challenges arose, it was necessary for the parties to take on extra tasks or greater risks than they were contractually obliged to. A prerequisite for this was that the other party acknowledged it and acted fairly, for example by compensating the contractor as agreed. In general, the interviewees were of the opinion that all parties kept their promises.

A concrete example of this reliability was that safety was taken seriously on a daily basis. It was not just mentioned in general declarations of intent. Management was proactive if the desired standard was not maintained. For example, the contractor's project director took defective equipment found on the construction site to 'The Safety Temple' and left it on display, which became a common practice that was used for teaching and learning.

Another example of reliability and the culture of collaboration was the way in which the managements from both the contractor and The Copenhagen Metro held 1:1 meetings and agreed that they wanted a culture of collaboration. The management devoted considerable resources to ensuring that everyone was on the same page as failure to act could result in people falling back into old patterns:

"Whenever it became apparent that not everyone was on board with the idea, we talked about it. I spent a lot of energy on that, because if you don't, you end up reverting to doing things the old way."

- Key stakeholder at The Copenhagen Metro



Intimacy

During the project, emphasis was on creating a sense of security among employees and partners through establishing close relationships.

A joint workplace was established for both consultants and The Copenhagen Metro, and the company and the contractors met regularly at the construction sites during the execution phase. Such co-location has been proven to have a positive impact on project success, and is an integral part of the Half Double methodology for the implementation of successful projects.

Furthermore, examples were mentioned of joint social events for The Copenhagen Metro's own employees, the consultants and the contractors. One of the external interviewees even referred to "The Metro Family", as close relationships were built up between the parties through many years of working together on the various stages of the Metro.

Close relationships were also built at management level through many years of collaboration on previous projects, which meant that:

"We knew each other and weren't starting from scratch. We also knew each other as people you could trust."

- Key stakeholder at The Copenhagen Metro

Another key part of the Half Double methodology is active leadership, which means that the management is personally engaged in the project and often visits in person. Several of the interviewees point out that the managements of both The Copenhagen Metro and the contractors were often physically present at the construction sites and were involved in finding concrete solutions and addressing concrete challenges. This practice undoubtedly contributed to creating a sense of security and peace of mind.



Reducing self-orientation

The last prerequisite for building trust is to minimise the focus on own interests. In connection with the M4 Sydhavn project, as mentioned, the parties started by focusing on their own interests as a way of creating trust. Openness about one's own interests as a catalyst for establishing common objectives made it easier to prioritise the common goal rather than one's own interests when unforeseen events arose.

As an example, the project was carried out during the covid-19 pandemic. When the pandemic rolled across Denmark in early 2020, the construction work was well underway, and many of the contractor's employees came from abroad. This meant that they were unable to enter Denmark for a period of time. To avoid unnecessary delays, The Copenhagen Metro had to work together with the Danish Ministry of Transport for example to find a solution that could keep the construction work going while respecting employee safety and the laws in force. One interviewee described the situation and what it meant for the project thus:

"It was no use that every time we had to bring in foreign workers they had to be quarantined until the results of their PCR tests were available. So, we looked at how we could help and make sure they didn't have to wait as long, so we ended up hiring a company that was accredited to perform the tests.

We made an investment in the project to ensure progress. We could have handled it differently and simply blamed the difficult situation on the contractor, saying that it was their responsibility and that they should have been prepared for such a scenario."

- Key stakeholder at The Copenhagen Metro

At the same time, the contractor took on a lot of responsibility and risk by sending their employees to work at a time when the rest of society was largely locked down and where there was a lot of uncertainty about covid-19 and its after-effects. Of course, the company and the contractor did a joint risk assessment with a common focus on ensuring compliance with the authorities' guidelines at all times. All of this requires that you invest in building trust – especially at senior management level.

This conclusion is supported by Flyvbjerg and Gardner, who in their book *How Big Things Get Done* write as follows on megaprojects:

"A leader of a multibillion-dollar public sector IT project told me he spent more than half his time acting like a diplomat, cultivating the understanding and support of stakeholders who could significantly influence his project. Why? It's risk management. If something goes wrong, the project's fate depends on the strength of those relationships. And when something goes wrong, it's too late to start developing and cultivating them. Build your bridges before you need them."

(Flyvbjerg, 2023 p. 189)

Theme 1

Learnings

Learnings from the M4 Sydhavn project on trust-based collaboration which can be transferred to future projects:

- Credibility is achieved by the client and the contractors demonstrating their professional experience and competence combined with an understanding of the other party's commercial interests. Therefore, it is necessary to build and connect experienced employees and managers.
- Reducing self-orientation requires trust, and for the interests of all parties to be reflected in the project's shared vision. Therefore, create openness about your own interests while building a strong collaborative culture with common goals, bold ambitions and a sense of pride in the project.
- The sense of trust is established through credibility, reliability and confidentiality combined with transparency about one's own interests. Invest in creating and maintaining trust, even if it takes time and many meetings. The result is that all parties throughout the project are willing to exercise flexibility when it comes to their own interests and contractual obligations.
- Invest in relationship-building, and create a sense of community among the parties, for example through co-locations and unifying activities, both work-related and social.





Flexible and solution-oriented

Theme 2

Theme 2

Flexible and solution-oriented

In a complex and dynamic project, lack of flexibility contributes to poor performance. This is one of the conclusions of a metastudy of more than 6,000 megaprojects aimed at identifying the causes of poor performance in megaprojects. One of the solutions to this is to: *“Establish a flexible project management approach balancing flexibility and control to navigate the multiple interfaces of the project”* (Denicol, Davies & Krystallis, 2020).

Or as one of the interviewees puts it:

“This means that you also have to show the necessary courage and drive to make a project shift. This is crucial in terms of how you act in relation to the outside world. I think that the most important thing in such projects is that of course we have formal frameworks and contracts, but to a large extent and in parallel with that, we look at what the success criteria are, and what it is we need to do and build.”

- Key stakeholder at The Copenhagen Metro

Initially, several of the interviewees pointed out the importance of not communicating an opening date for M4 Sydhavn until the beginning of 2024, by which time it was relatively certain that it would be possible to open in June 2024. Until then, all that had been communicated was that M4 Sydhavn would open in 2024. On the one hand, it meant that one could maintain a high degree of credibility vis-à-vis the customers while supporting the Metro’s reputation, and on

the other hand, it helped to take some of the pressure off the actual project organisation and allow some flexibility in planning right up until when the opening date was announced.



Flexible players

The M4 Sydhavn project was very much affected by unforeseen situations in connection with the covid-19 pandemic. To ensure progress during such highly challenging situations, it is essential that several of the stakeholders associated with the project show flexibility and have a solution-oriented mindset. As mentioned, both the tunnel contractor and The Copenhagen Metro showed a high degree of flexibility in the situation – among other things to get back on schedule after the pandemic. As one of the interviewees puts it:

“There are thousands of examples where solutions had to be found. When you have a contract involving six years of construction work, it is inevitable that changes occur along the way. In this project, the changes were extraordinary.”

- Key stakeholder at The Copenhagen Metro

From several sides, it is pointed out that one of the reasons for the parties' solution-oriented approach was that they were continuously entering into financial agreements on the changes occurring along the way. This meant that the parties were willing to subsequently find solutions to new challenges, as they felt that they were treated fairly and were compensated for any additional costs they incurred. As one interviewee puts it:

“From the other side, the extra work and the flexibility we showed were recognised. It helped us that they made decisions very quickly.

They showed us that we were working towards same goal. We found solutions together ... The customer deserves this, and we were acknowledged.”

- Key stakeholder from the owners/authorities/suppliers/consultants



Flexible authorities

Throughout the project, the authorities have shown great flexibility, for example when the covid-19 pandemic hit.

In that situation, the parties made a point of keeping each other informed about what was coming from the Danish government that might have a bearing on the project, as well as the consequences of not being able to bring foreign labour into the country. In this way, solutions to the challenges could be found together, and project progress ensured:

“The authorities helped to make it possible. Everyone had to stay at home, so the work had to be categorised as critical work. And we also had to find solutions to all the social distancing requirements. We had to devise special rules for how close you could be, and we also had to make sure that the workers who were entering the country were, in fact, permitted to do so. So we wrote letters explaining that it was crucial that they came to Denmark and worked. Our owners supported us in this.”

- Key stakeholder at The Copenhagen Metro

In addition, in some cases the owners and the authorities also

assumed more responsibility than expected of them in order to ensure progress. For example, the Danish Ministry of Transport decided to establish a collaboration between the parties which had an interest in the new traffic hub at København Syd – Banedanmark, DSB and The Copenhagen Metro. The Ministry, among other things, helped to obtain the necessary financing to realise the specific part of the project as desired.

The Danish Transport Authority also played a proactive role in connection with the safety approval of the M4 Sydhavn line. This was evident from the fact that they dedicated a project manager to approve the project, and they also went out of their way to ensure a smooth approval process:

“Even though we had executive meetings in the calendar, there were times when everything simply had to fall into place. We could have sat back, but we got on with what was needed: Remember to have this documentation sent to us. I told my team manager to call them regularly and to make sure that we asked them the right questions. We wanted to make sure they understood what we meant when we asked for something.”

- Key stakeholder from the owners/authorities/suppliers/consultants

Flexible suppliers

The Copenhagen Metro is fully automated and driverless. A large part of the project is therefore basically a large IT project. And IT projects often experience delays and budget overruns. The average IT project exceeds its budget by 75%, and 13% of all IT projects have an average cost overrun of 631%: *“When IT projects go wrong, they do so spectacularly, and in a way that is unique to IT.”*(IT University of Copenhagen, 2021)

Implement Consulting Group’s experience from similar megaprojects is that challenges often arise in relation to the integration of systems. And in megaprojects, multiple IT systems often have to work together. In the case of M4 Sydhavn, the challenge was that the new line had to interoperate with the M3 line. This gave rise to potentially major integration challenges.

To minimise the risk, The Copenhagen Metro directly awarded the contract for the delivery of the control system for M4 Sydhavn to the supplier that had supplied the control system for M3. Despite this, challenges arose in connection with the integration of M4 Sydhavn with the M3 line as the power supply system was supplied by a different supplier to the one supplying the control system. However,

one of the suppliers proved flexible:

“When we switched on the system, we came face to face with a critical problem. This caused some worries. And of course, there were some discussions, but in the end, we offered to help find a solution. And it was greatly appreciated by The Copenhagen Metro. We had the common goal in mind. We could have just sat back, but we didn’t want to create a big problem. We wanted to help, solve the problem and move on.”

- Key stakeholder from the owners/authorities/suppliers/consultants

According to several interviewees, the service operator, Metro Service, also showed a high degree of flexibility. In connection with final testing of the system prior to commissioning, the operation of M3 often had to be reorganised at relatively short notice. This required flexibility on the part of Metro Service. As one interviewee puts it:

“The flexibility that the operator has shown has contributed [to ensuring that the project was delivered on time, ed.]. If we had been working with a rigid operator, we would have had a much harder time making the changes which were needed for the project.”

- Key stakeholder at The Copenhagen Metro

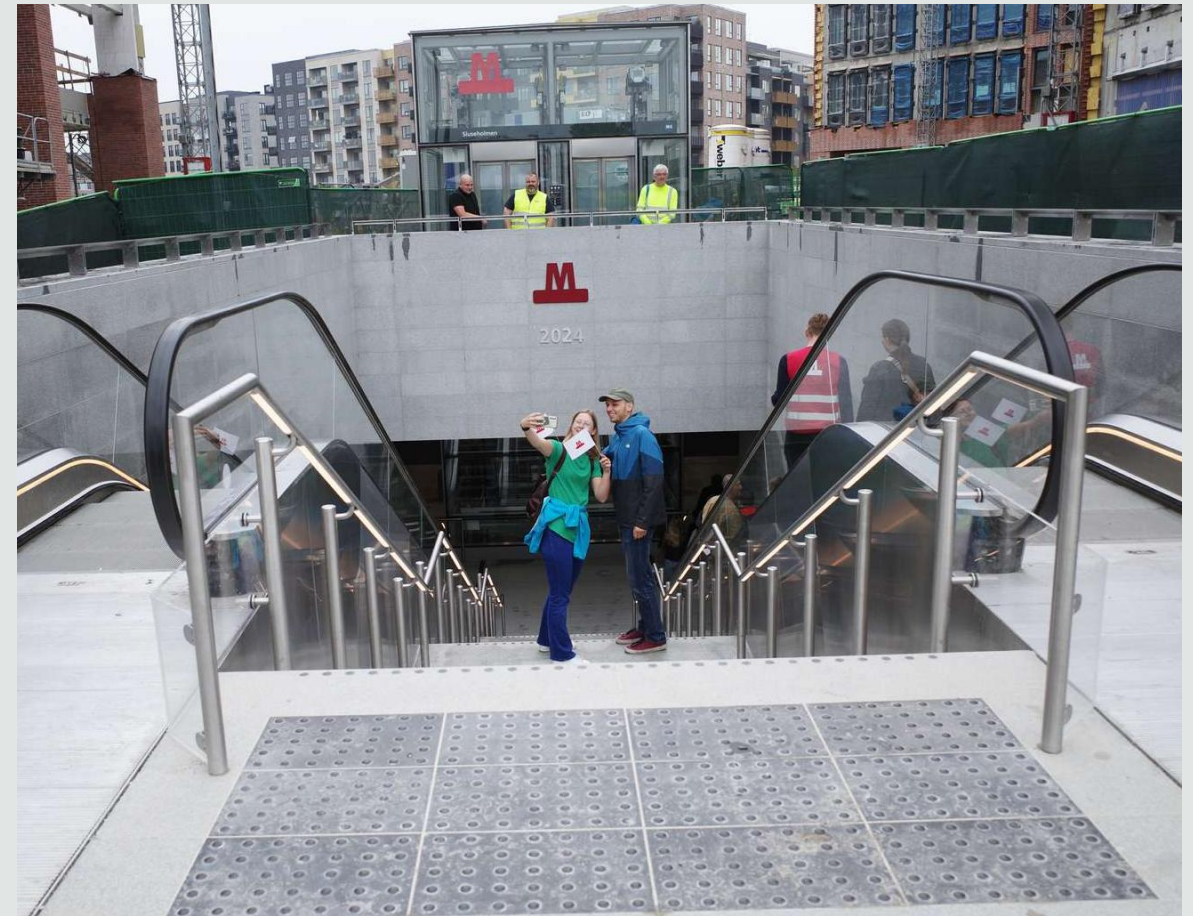
Theme 2

Learnings

The learnings from the M4 Sydhavn project about flexibility and being solution-oriented are that:

- The Copenhagen Metro has engaged in active contract management aimed at striking the right balance between control and flexibility, where financial agreements on changes were entered into on an ongoing basis.
- The authorities, like the client, contractors and consultants, have been proactive and supportive of the flexible solutions needed to ensure progress.
- Being solution-oriented has been crucial to ensuring progress during unforeseen events, including the covid-19 pandemic and the global supply chain crisis, where the company and the authorities assisted the contractor with measures (covid-testing facilities, material procurement etc.) to ensure progress.
- The opening was communicated as a year and not a date, which gave all the parties a certain degree of flexibility.

All this would probably not have been the case if such a high degree of trust and collaboration had not been created (theme 1), or if the right incentives had not been present (theme 4), which is why the themes are closely interconnected.





Experience and competences

Theme 3

Experience and competences

According to the latest research literature, it is crucial for the success of megaprojects that you build on experience. As Flyvbjerg and Gardner (2023, p.188) put it:

“Your project is special, but unless you’re doing what has literally never been done before – building a time machine, engineering a black hole – it is not unique; it’s part of a larger class of projects. Think of your project as ‘one of those’, gather data, and learn from all the experience those numbers represent by making reference-class forecasts. Use the same focus to spot and mitigate risks.”

Advantage of being a client with experience from multiple projects

The Copenhagen Metro has to a large extent drawn on experiences from previous projects, e.g. M3 and M4 Nordhavn. Through previous metro construction projects, The Copenhagen Metro has built up extensive knowledge and experience, which has ensured a sound basis for being able to build and deliver on time, within budget and with the agreed benefits. An important part of this is building competences, but also the ability to recognise when external expertise is needed, for example consultants. An interviewee describes it in this way when asked about the project’s critical success factors:



Theme 3

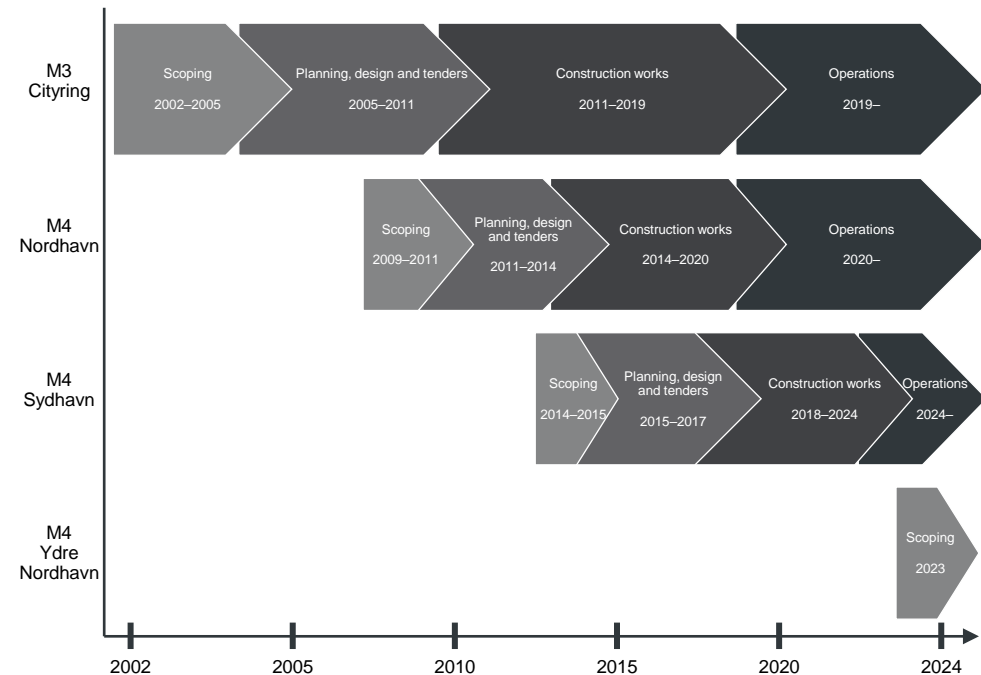
“The prerequisites were there – in terms of experience and competences. We have been involved in several construction projects, one after the other. We have this soft curve, where we’ve been able to continuously build experience because we’ve been building continuously. So, it’s crucial. And this includes being able to tell when you lack the right skills. This takes experience. So that’s number one for me.”

- Key stakeholder at The Copenhagen Metro

It is exactly the above-mentioned soft curve of continuous and overlapping metro projects, cf. the figure on the right, that has created an accumulated body of learnings that was actively used to improve the Sydhavn project. Virtually all interviewees at The Copenhagen Metro describe specific lessons that were learned in connection with, for example, M3. This shows the value of ensuring a high degree of flow, and where lessons are continually being learned.

The same approach has not been used for other well-known megaprojects, such as the ‘super hospitals’, where the construction projects were initiated almost simultaneously. As a result, there is less opportunity to actively learn from experience. In Kjær and Thuesen’s report ‘*Evaluering af rammevilkår for kvalitetsfondsprojekterne*’ (Evaluation of framework conditions for the quality fund projects) (2024), they arrive at the following conclusion:

“From a construction perspective, initiating all the projects within a few years of each other was inexpedient as the limited competences came under pressure right from the outset, and the subsequent specialisation within hospital construction was diluted. Many have practised a little, but practice makes perfect.”



The Copenhagen Metro as a competent building contractor

The Copenhagen Metro's ability to act as a competent building contractor has been crucial for the success of the project. This is the view expressed by The Copenhagen Metro internally as well as by external stakeholders and partners. The organisation's experience with large construction projects has meant that the employees had the necessary knowledge and experience to tackle complex challenges effectively. This experience was carried over from projects such as M3 and M4 Nordhavn, which enabled the organisation to react quickly and competently to unforeseen events. An interviewee comments thus when asked about the project's main critical success factors:

“The fact that we had an organisation in place. We were working on M3 at the same time. We had many competences in-house, because we were already up and running. Of course, we've also had to work hard for it, but it was a huge advantage that you knew what you were embarking on and had people who know what they were doing. That's the key success factor.”

- Key stakeholder at The Copenhagen Metro

Moreover, The Copenhagen Metro has also worked systematically to retain and attract competent and experienced employees, which has ensured a stable and competent project organisation throughout the

duration of the entire project. Thus, the experience resides not only in the organisation, but also in the team realising the project. Key Copenhagen Metro stakeholders refer to the fact that the project's success is largely due to a team of high performers. The Copenhagen Metro has thus worked systematically to build and retain person-dependent competences in-house, and has succeeded at promoting employees internally. At the same time, however, a need is voiced for systematising roles and responsibilities more as well as a need for flow descriptions to be part of the strategy to improve the organisation's efficiency and learning, and thus reduce its reliance on person-dependent competences.

The work of recruiting and retaining the right profiles is described as follows by a key player:

“We want to offer a strong professional working environment with exciting tasks. And there's also an element of timing. If too much time had passed since completing M3, we would probably have lost these talented people. So, you need an exciting project portfolio to retain talents. Without it, they disappear. Being a strong client is also about being state-of-the-art rather than first mover. We continue to be the best at doing what works. This is the vision for our role as building contractors. It's up to others to test things out first.”

- Key stakeholder at The Copenhagen Metro

Experiences from previous projects

Instead of seeing your project as something unique, it should be seen as part of a reference class of projects that many others have tried before. The experience from these earlier projects must be taken on board and learned from in order to strengthen the project's robustness. The Copenhagen Metro reference class has largely been the earlier metro construction projects M1, M2 and, in particular, M3 and M4 Nordhavn.

One example of a very specific lesson (among many) from M3 is the handling of interfaces and milestones between different contractors. During M3, there were challenges in coordinating milestones, which led to delays. This challenge was resolved in the Sydhavn project, where the client took responsibility by creating a detailed and robust milestone plan which ensured that the interfaces between the contractors were handled efficiently. It is described as follows:

“With M4, we focused on the lessons learned from previous projects, and which were implemented systematically. I remember a challenge from M3, which was to do with the milestones that had to be reached by the various contractors before the next one could start. It was about proper planning in relation to the interfaces between the contractors. We focused a lot on this with the M4 project, and prepared a proper milestone plan for when one should be finished

and the other could start. So, we used this whole execution methodology a lot with M4. We drew up a more detailed and robust plan so that we could define these milestones and ensure that they were realistic.”

- Key stakeholder at The Copenhagen Metro

Another example of a specific lesson from M3 is how noise was handled. Both The Copenhagen Metro and the authorities had experience in this area, and before construction began, the authorities worked actively with the Danish Noise Order (*Støjbekendtgørelsen*) to ensure that the framework for the Sydhavn project was in place before start-up. Thus, The Copenhagen Metro knew the rules and how to compensate neighbours. An interviewee describes it thus:

“In connection with M3, we were criticised a lot regarding noise levels during the construction phase. We learned a lot about communication during the M3 project, which we could then build on with M4. Another big advantage was that the rules on compensation were in place right from the start of the project. So, during the construction of M3 we learned how to handle difficult situations. On M4 Sydhavn, we were more aware of the things that had been difficult on M3.”

- Key stakeholder at The Copenhagen Metro

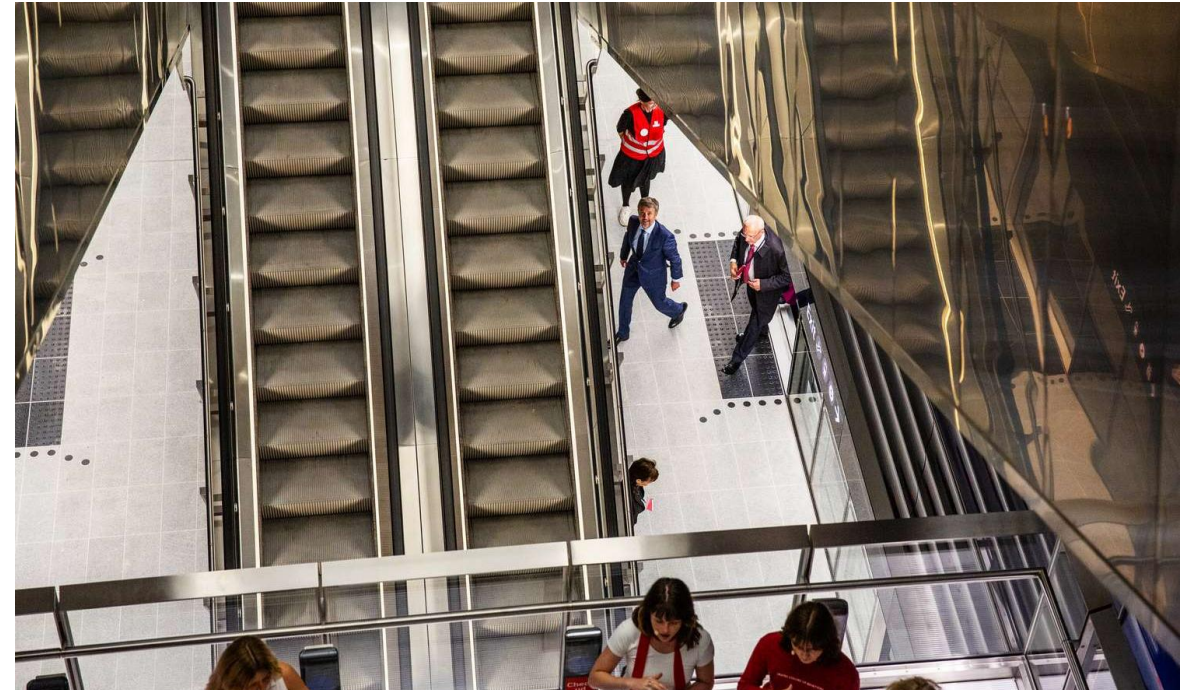
Thorough analysis phase

The Sydhavn project was initiated with a thorough analysis and planning phase, and key players in The Copenhagen Metro see this as a significant factor for the project's success. Thorough analyses of the line routing, the location of the stations, passenger flows and other critical factors ensured that the project was planned realistically and thoroughly, with a robust budget that was neither under nor over-budgeted, but based on solid knowledge of actual prices from the previous metro construction projects.

The prerequisites for being able to do a detailed plan with the right analyses of, among other things, time and budget have been established through experience from previous projects. Thorough planning ensured rapid execution. This included, among other things, detailed noise analyses and communication with neighbours, as well as compensation, which minimised the risk of unforeseen problems during construction.

The thorough analysis phase is also described by Bent Flyvbjerg and Dan Gardner (2023) as a decisive factor for the success of a project. According to Flyvbjerg and Gardner, a thorough analysis phase, which involves working on a detailed and tested plan, increases the chances of the project being delivered quickly and efficiently, because it keeps the delivery window (construction phase) open for the

shortest possible time. Because it is during the actual construction phase that the project is open to risks. Flyvbjerg and Gardner call this *Think Slow, Act Fast*. A thorough analysis phase is thus a critical success factor in the delivery of megaprojects, but at the same time it is necessary to pay attention to planning the right things at the right time, cf. the points about flexibility under theme 2.



Modularisation

The Copenhagen Metro has worked with standard solutions to minimise uncertainties and risks. By using standardised solutions and building on known technologies and methods, The Copenhagen Metro has reduced complexity and improved reliability. For example, the tried-and-tested standard stations from M3 were used for M4 Sydhavn, which not only minimised design risks, but also enabled a more accurate calculation of construction costs.

“We simply had experience from constructing M3, which meant we were working with well-tested concepts. In fact, as part of the scoping, stations had been drawn that were not actually built because of a precautionary principle. Subsequently, one would probably say that we could have done so, but in dialogue with the owners we agreed not to take unnecessary risks. So we built according to the principle of “More of the same”, with standard stations for the most

part. Of course, because of our experience, we were able to calculate passenger numbers in a way that was more reliable than before. We had experience on which to build the models, and the same goes for our financial estimates, where we had fresh experience in terms of quantities and processes.”

- Key stakeholder at The Copenhagen Metro

The Copenhagen Metro’s use of standard solutions brings to mind Bent Flyvbjerg and Dan Gardner’s (2023) description of modularisation, where they describe how megaprojects are often composed of smaller parts – the so-called LEGO bricks. Modularisation makes for more reliable planning in the realisation of megaprojects. If you look at the Metro as a whole, it is a megaproject. However, if you break it down into smaller parts, the entire Metro consists of a lot of stations and tunnel elements – and it is precisely these stations and elements that The Copenhagen Metro has become very good at building safely, strongly and thus with few risks.

Theme 3

Learnings

The learnings about experience and competences are that

- Experience from one's own projects and other people's projects must be used actively and systematically to solve concrete and comparable problems. This ensures continuity and benefit realisation.
- Investing in a thorough analysis phase and focusing on realistic and robust planning strengthens the ability to execute efficiently during the construction phase.
- Using standardised solutions reduces complexity and risks.
- All partners having competent and experienced teams is a prerequisite for successful implementation. Therefore, systematic work to retain people with the right competences is very important.
- Experience from previous projects makes it possible to anticipate and handle challenges proactively. It is an advantage when a project is an immediate extension of previous projects.





Company structure and incentives

Theme 4

Theme 4

Company structure and incentives

A typical challenge when starting up megaprojects is that the task of describing and developing deliverables is initiated without first establishing a common understanding of the project's ambition and content among the most important stakeholders (Falholt et. al, 2022).

In the M4 Sydhavn project, the project's framework and direction were supported by The Copenhagen Metro's unique corporate structure, where the company has overall responsibility for the design, construction and operation of the Metro. The structure means that The Copenhagen Metro bears full responsibility for the project's schedule, budget and the desired benefits, which creates a very clear purpose and incentives: Timely completion of the project so that debt can be repaid through passenger revenue.

Thus, both The Copenhagen Metro as building contractor and the owners share a considerable incentive to deliver the project, which is why the ambition and content are in place before starting to develop the deliverables. This creates a solid foundation for a megaproject.

An interviewee draws attention to the framework conditions:

“Our framework conditions were simply in place, which was a huge strength. The company, the Board and the owners have leverage. The incentive was clear, and all risk in relation to the budget lay with the company. The bill would end up on our desk. We have complete responsibility for the timing, budget and benefits. But you also need to have the competences. That meant that we were razor sharp in every

respect. Our collaboration with the owners was very simple, because the owners did what they did best while we simply did the building.”

- Key stakeholder at The Copenhagen Metro

The allocation of responsibility ensures that all risks and decisions lie with The Copenhagen Metro in the form of the company's Board and Executive Management Group, which creates a clear incentive structure. Once the owners have decided on the project, the Board has the mandate to make all decisions within the allocated budget. This makes it clear to all parties involved that it is in The Copenhagen Metro's interest to deliver the project on time and within budget – because if it does not open on time, it will impact the company's earnings.

The evaluation identifies a massive focus on creating societal value in the form of mobility – as well as the overall purpose: to secure revenues so that the debt from constructing the metro system can be paid off. The Copenhagen Metro's strong focus on the purpose ties in well with the Half Double methodology's focus on impact, which describes how no project exists for its own sake, but rather to create impact. The key to success is to identify and focus on impact from the start of the project, as this can shift the project's focus from not only being on technical deliverables, but rather on how to ensure impact throughout the project life cycle. Implement Consulting Group's experience with other megaprojects is that a key focus for success is to reduce bureaucracy and focus on clear goals (Implement Consulting Group, 2024).

Theme 4

The company structure thus supports the purpose; to make money by securing a mandate from the Board, so that the Executive Management Group and project organisation can make the decisions needed to get the project delivered on time. In this company structure, the owners give a mandate to The Copenhagen Metro while playing an active role in supporting the success of the project. An interviewee provides an example:

“We decided on a new commercial strategy 18 months earlier, where M4 Sydhavn played an active role. So M4 was pervaded by the idea that we had to make money through passenger revenue from day one, and that was paramount in all considerations. In relation to buses, for example, we said that the most important thing was to make money from the outset, so how do we get the buses to support this? The City of Copenhagen then became involved in looking at how passengers could be made to arrive at the right place in order to be able to take the Metro.”

- Key stakeholder at The Copenhagen Metro



Incentives for owners

The Copenhagen Metro's three owners – the Danish State, the City of Copenhagen and the City of Frederiksberg – obviously supported the common goals of the project as its owners, but at the same time had individual goals which ensured strong engagement and prioritisation of the project. A key player from The Copenhagen Metro comments as follows:

“On the planning front, it was also a project where the owners talked about how the Metro could change the city and create value. In terms of urban planning, the M4 was routed better than M3. Many aspects of M4 were interesting, and the owners could see potentials for themselves ... So, we experienced insightful commitment on the part of the owners, and we had become experienced ourselves, but so had the owners, and they were clear about what they wanted from the project.”

- Key stakeholder at The Copenhagen Metro

Representatives of the owners supported this and stated in connection with the interviews conducted that:

“The City of Copenhagen has been very keen to see that the actual metro line – that is, the points on the way out there – was built.”

- Key stakeholder from the owners/authorities/suppliers/consultants

And another key stakeholder said:

“It has been our wish from the very outset to create a new hub for public transport in Copenhagen. We've tried before with Høje Taastrup. København Syd is a new attempt to create a location where several lines converge.”

- Key stakeholder from the owners/authorities/suppliers/consultants

With the vision of creating mobility in Copenhagen, the different parties set to work with both common goals and individual goals, and the parties collectively supported both the common and the individual goals to ensure the common good for the project. A key goal for all project parties was to open M4 at the agreed time. This consensus on timing as an overall goal has meant that everyone has had a very clear passenger focus, and the parties have contributed positively and qualitatively to ensuring constant project progress. In addition, there have been various individual goals, such as urban development, ensuring passenger intake, relieving the burden on the Central Station and the possibility of extending the metro line. The key to the success of the project is that the individual goals were not conflicting, but rather supportive of M4 being delivered on time, on budget and in terms of benefits.

Commercial focus

The Copenhagen Metro's commercial focus has meant that targeted efforts were made as early as the construction phase to ensure the planned passenger growth, which has been decisive for realising the project's benefits. This happened as part of a commercial strategy focused on attracting passengers from day one. As described in the business strategy for the Metro for 2023–2026:

Stronger marketing will draw the Metro and its potential as an attractive and sustainable mode of transport more firmly in the minds of its users.

The commercial strategy supports a strengthened focus on operations. The Copenhagen Metro is thus not just a construction company and building contractor, but a mobility partner in Copenhagen. There is thus a clear understanding that the owners have established The Copenhagen Metro to transport passengers and thus make money. This creates significant commercial focus and leads to targeted strategic work to get passengers to choose the Metro from day one. Part of this strategy included, for example, extensive marketing campaigns and the creation of a Facebook group, which attracted up to 10,000 followers and aimed to create excitement and anticipation around the opening of M4 Sydhavn. In addition, free tickets were distributed to neighbours and businesses. An interviewee explains as follows:

“Everything we’ve done in the past six months has been about generating revenue from the opening of M4. So, it’s been interesting to look at passenger behaviour and how they change their habits. This is what has led us to offer free tickets, with passengers receiving five free tickets a month for six months. Our campaign was targeted at the neighbours in the Sydhavn area receiving vouchers by post. And the companies in the area were also in focus, and have been offered free travel.”

- Key stakeholder at The Copenhagen Metro

The aim of these and other initiatives was to change passenger behaviour and ensure that the Metro became the preferred mode of transport from the start. The experience from M3 showed that if you did not keep up the pressure from the word go and invest significantly, people would not automatically change habits.

The significant focus on passenger growth was supported by thorough analyses. At an early stage, analyses were carried out of the target group for M4 and thus The Copenhagen Metro's new customers. The target groups counted in particular residents and businesses along the M4 line. In addition, the focus was on the line's interaction with other transport modes, including how cycling and taking the Metro are not incompatible, but rather that they tie in with one another.

Theme 4

The Copenhagen Metro adopted a new approach in marketing M4: it was all about developing a sense of pride and expectation among customers. Historically, The Copenhagen Metro has been apologetic about, for example, the noise and clutter from its construction sites, but with the M4 Sydhavn project, this was turned on its head, and a narrative was created about how fantastic it would be when the construction work was completed, and in so doing expectations were built that would be met once the line opened. It is the Copenhagen Metro's experience that this approach has had a positive impact on passenger influx.



Theme 4

Learnings

The Copenhagen Metro company structure, with responsibility for design, construction and operation, has been a decisive factor in the successful delivery of the M4 Sydhavn project on time, within budget and with the desired benefits.

The learnings about corporate structure and incentives are that

- Having overall responsibility for design, construction and operation ensures a clear purpose: Timely completion of the project so that debt can be repaid through passenger revenue.
- Clearly mandating the company to make all decisions within the allocated budget ensures progress.
- A strong commercial focus on future passengers, also during the construction phase, supports the realisation of the project's impacts and benefits – to create increased mobility.
- By working with both the common goals and individual goals of the company and the owners, incentives were ensured for all parties.





Management and governance

Theme 5

Theme 5

Management and governance

According to the Half Double methodology, leadership is one of the elements that needs the most attention in a project, and the leadership needs to be able to embrace uncertainties while ensuring alignment and progress (Half Double, p. 43). Half Double focuses on less bureaucracy, less formal steering group meetings and less contractual focus. Projects need managers who can handle turbulence, conflicts and people. Managers who focus on human aspects, work closely together, handle problems together, and know the project in depth.

In their metastudy of more than 6,000 megaprojects, Denicol, Davies and Krystallis (2020) find that one of the main causes of poor performance in megaprojects is poorly defined roles and responsibilities throughout the project life cycle.

Management is a key element in delivering a successful project, and it has also been a critical success factor for the M4 Sydhavn project. The type of manager who, in the Half Double methodology, has a documented effect on the success of projects is identified to a large extent in the M4 Sydhavn project, and is thus another critical success factor for delivering the project on time, within budget and with the desired benefits.



Clear roles and responsibilities

The Copenhagen Metro has established a governance structure in which clear roles and responsibilities are defined to ensure effective collaboration and project progress.

Key stakeholders from The Copenhagen Metro have collaborated well during the M4 Sydhavn project, with a clear division of roles that has made it possible to make decisions quickly and efficiently. For example, there has been a very clear division between the technical director and the project director, where the former has been responsible for overall management of the construction with executive responsibility, while the latter has been responsible for project management. Thus, there was no experience of elements of daily operations needing to be raised to another level, except in connection with significant challenges. This division contributed to the project remaining on track even when challenges arose. An interviewee from the company explains it thus when asked whether there were clear roles and responsibilities in the project:

“Yes, definitely. The technical director doesn’t get involved in detailed planning. He’s always the one to sign on the dotted line. There are

very clear roles and responsibilities and powers. You pass on claims, and then it is the technical director’s responsibility with regard to the budget. But the project must not grind to a halt.”

- Key stakeholder at The Copenhagen Metro

Furthermore, the collaboration with the contractors has been structured with clear points of contact and responsibility. This meant that the contractors knew exactly who to turn to with questions or problems, which reduced the risk of misunderstandings and delays. There was one key person who spoke to the contractor to ensure clear lines of communication and to avoid confusion. This is explained in the following way:

“One person handled communication with the contractor, so they were in no doubt about what the client wanted. But then there was also, for example, a department that dealt with complaints from neighbours, and then a person from that department would then talk to a site manager. But it would not be that department talking to the contractor. Our site manager talks to their site manager, and the project director talks to the project director, so you’re never in doubt.”

- Key stakeholder at The Copenhagen Metro

Cooperation with owners

Throughout the project, there has been regular reporting. The Executive Management Group has been informed about the project's progress on an ongoing, monthly basis. The Board has received quarterly, and for the last six months prior to the opening, monthly status reports on the project's finances and progress, while the Board's Risk Committee has received an overall risk assessment of the project each quarter. Finally, status reports have been passed on to the owners at regular quarterly meetings, and to the Danish Ministry of Transport every six months.

Throughout the project, there has been open communication on progress, finances, risks and mitigation. This has helped to create peace of mind for the owners, and thus given The Copenhagen Metro's Board and Executive Management Group the space needed to ensure progress. At the same time, there was an understanding among the owners that if The Copenhagen Metro contacted them and asked for assistance, it was because they needed it. As one of the interviewees puts it:

“Part of the collaboration with them, an unwritten contract as it were, is that when they come and ask for something, it's not for fun. They mean it, and they have to want it, and then of course we'll do it.”

- Key stakeholder from the owners/authorities/suppliers/consultants

The collaboration between the owners and The Copenhagen Metro was thus characterised by clear communication and mutual support.

The owners have clearly expressed their wishes, and have supported The Copenhagen Metro when challenges arose. There has been a high degree of transparency and close cooperation, especially in critical situations.

Changes to the project that required approvals or financing were handled quickly and efficiently thanks to the owners, for example the redesign of the København Syd station from an above-ground to an underground station. A quick decision had to be made by the owners to avoid the schedule from being impacted. In the political agreement, no money had been allocated for an underground station, and the funding had to be found. This was arranged in a parallel process, while tenders were simultaneously sent out to contractors that a deep station possibly needed to be built rather than an elevated station as originally planned. Before the final contract was signed, a decision had been made to build a station below ground level. An interviewee describes it as follows:

“We had to find financing for the deep station, and did the calculations while the tender process was already underway. So, when the financing finally fell into place, the planning and design also fell into place, and then we started receiving tenders for the right construction together with our owners. It all happened in the space of a few months. And it only happened because our owners – the Danish State and the local municipalities – were on board.”

- Key stakeholder at The Copenhagen Metro

Flow in the project

A central tool in the Half Double methodology is Flow. A documented effect on the success of projects is a certain rhythm in key events – a so-called fixed heartbeat, which creates higher efficiency, better quality and ultimately speed. By focusing on flow, simple methods – such as a fixed meeting at a fixed frequency – can intensify the project work, ensure progress and deliver results faster.

An example of this from the M4 project is the intensified reporting at executive meetings during the last six months of the project. Every 14 days, the project management and the Executive Management Group met to talk about major outstanding issues and jointly identify and prioritise the most important focus points up until the opening. The purpose was to clarify which shortfalls were acceptable, and which should be fixed in time for the opening. The focus was not on going through non-conformity lists, but instead on considering outstanding issues together with operations, and agreeing on what was most important to focus on for the next 14 days. Specifically, it also meant that the directors have been able to help remove obstacles and prioritise within their areas, which has ensured progress, especially in the final phase of the project. During this phase, The Copenhagen Metro's framework conditions – involving overall responsibility for both construction and operations – support project progress, as it is The Copenhagen Metro itself that must balance all considerations with regard to the construction work, opening date and subsequent operations.

Key players in The Copenhagen Metro point out that this may seem banal, and one may ask oneself why it has to be right up at executive level, but it ensures that things are balanced, and ensures buy-in throughout the matrix organisation. With this management approach, the company succeeded in striking a balance whereby the executive level did not concern itself with the tiniest details, but still with enough detail. This ensured progress and focus in the last and most critical project phase.



Decision-making power

Through the project, The Copenhagen Metro has ensured that the decision-making power has been present at the right levels in the organisation. The culture has been one of trust and authority, where key employees have had the necessary leeway to make decisions. This has allowed the project to solve problems without unnecessary escalation. Denicol, Davies and Krystallis (2020) point out that paying insufficient attention to the design of the governance structure and its development over time can lead to poor performance. The Copenhagen Metro has ensured a transparent governance structure, where it was clear who was responsible for what. Also from an external perspective, The Copenhagen Metro's ability to ensure decision-making capabilities among the key employees is identified as a crucial factor for the project's progress.

Creating an effective governance structure requires the right competences, but The Copenhagen Metro's corporate structure as a smaller, agile, flat matrix organisation was found to be an advantage, and strengthens the muscle that has been built up through the previous Metro construction projects. The Copenhagen Metro is considered by many to be a new and modern organisation, one that is not burdened by historical hierarchies. The Copenhagen Metro's corporate structure supports the possibility of acting in a relatively agile manner while reporting to the Board, where the owners are

represented, but without too many formal decision-making levels which can hinder progress.

“From the outside, it does indeed resemble a small and agile organisation. It's not a big old organisation that needs to transform itself. It was born more recently, without being burdened by old, institutional trappings. It is a modern organisation. It affects your ability to act.”

- Key stakeholder from the owners/authorities/suppliers/consultants

According to Falholt, Højdaahl and Lau (2022), this structure is called a strong matrix organisation, where the decision-making power lies in the megaproject organisation, and it has a number of advantages that are key to a project like this. The advantages are that it becomes easier to make decisions and develop complete solutions. In addition, dependencies between sub-projects are easier to manage, and there is more control over the progress, solution scope and budget of the megaproject. These are all elements that have helped to ensure the delivery of the M4 Sydhavn project on time, within budget and with the desired benefits. In contrast, a weak matrix organisation is where the decision-making power lies primarily in the recipient organisation, which is more often the case in, for example, agencies with a more traditional, hierarchical structure, and thus a weaker decision-making mandate in the project organisation.

Problem-solving at the right level

In continuation of the point about decision-making power, it would also appear that the project has been characterised by problems being solved at the level at which they arose. This has ensured that progress was not disrupted, and that solutions were found quickly. By solving the problems locally and quickly, The Copenhagen Metro has managed to keep the project on track and avoid major delays.

In addition, there has been a clear understanding that problems had to be solved in collaboration with the relevant parties. This has meant that contractors and other partners have been involved in the problem-solving, which has ensured that the solutions were realistic and could be implemented quickly. This approach has also created a culture of collaboration and mutual respect.

In addition, The Copenhagen Metro has fostered a culture where internal consultants and specialists have been listened to, ensuring that decisions were made on a well-informed basis. This means that even though the problems were solved at the right levels and where they arose, one has still gone back to the organisation, made enquiries, and ensured that the solution builds on the right knowledge. An interviewee has the following perspective:

“The project director has been good at using The Copenhagen Metro’s specialists as his closest consultants, and not a week passed

where he did not talk to the respective experts on the respective contracts in relation to when do we accept claims, when don’t we accept claims etc. Everyone was listened to, and synergies were achieved in this project, because people pulled together internally in the company. A good starting point is to consider the legal position, and listen to the experts before talking to the contractor.”

- Key stakeholder at The Copenhagen Metro



Theme 5

Learnings

The Copenhagen Metro has demonstrated sound management and good governance with clear roles and responsibilities in the construction of M4 Sydhavn. Through a well-structured organisation with active leadership, clear roles, decision-making power at the right levels, effective problem-solving and clear contact points, the project has been able to deliver on time, within budget and with the desired benefits.

The learnings about management and governance are that:

- An effective governance structure with clearly defined roles and responsibilities has ensured project progress. Based on its in-house competences, the company has assumed control and ensured quick and coherent decision-making.
- Key persons were authorised to make necessary decisions without unnecessary escalation, ensuring that issues were resolved at the level at which they arose.
- Effective communication has been ensured by having clear points of contact in collaboration with contractors and the authorities.
- The company's relatively small, agile, flat matrix organisation enabled fast and solution-oriented responses to unforeseen challenges and opportunities.
- Regular reporting to the Board and owners has ensured a common understanding of the project's progress and risk profile, as well as ensuring quick and effective owner involvement when major changes were needed.



Appendices

Appendix 1: The Copenhagen Metro



Appendix 2: Bibliography

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