Redeveloping neglected maritime heritage

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Introduction

In general, the reuse of heritage is becoming increasingly popular, particularly industrial heritage such as factories, breweries, and warehouses (Hettema & Egberts, 2019). One of these heritage sites is the Waterdriehoek, a region near Dordrecht. This area experienced significant growth during the 20th century due to the global demand for their dredging technology, transforming small villages like Papendrecht, Sliedrecht, and Alblasserdam into thriving industrial hubs. However, as larger ships and more space were required, many companies relocated to Rotterdam, leaving their maritime sites behind. These sites often remain unused for decades, and when eventually redevelopment plans are being made their historical significance is frequently overlooked. The Delta Shipyard in the Waterdriehoek is one of these maritime sites. For the past 30 years, the site has remained largely unused, with only two short-term temporary functions occupying it during this time. The most recent plan, proposed in 2023, suggests erasing the shipyard's history entirely to make way for expensive housing on the waterfront with no meaningful connection to the site's legacy or its surroundings.

The reuse of old shipyards is essential to preserving cultural heritage, rather than demolishing it (Auclair & Fairclough, 2015; Tweed & Sutherland, 2007). Historic shipyards present opportunities for the sustainable development of historic landscapes and their communities. They can offer both residents and visitors "anchors for identification" (Hettema & Egberts, 2019). Additionally, reusing buildings and materials is less harmful to the environment, and the contrast between existing old materials and new ones often results in exciting new architectural designs.

For these reasons, historic shipyards are being reused worldwide. It is essential for past, present, and future generations of these port cities to understand the meaning and influence these shipyards have had on their communities. In redeveloping shipyards, it is important to make deliberate choices during the process: which parts of the shipyard's history are retold, which features are assigned heritage value, what will be its future function, and — perhaps most importantly — how do architects integrate all these elements into their designs (Hettema & Egberts, 2019)?

Research aim and question

Although industrial heritage is well-studied today and the interest in reusing industrial buildings has boomed, shipyards remain underrepresented in research on industrial heritage (Hettema & Egberts, 2019). Industrial heritage often focuses on factories, warehouses, and breweries, which have been thoroughly documented and transformed into residential, commercial, or cultural spaces. However, shipyards, a vital part of industrial and maritime history, receive far less attention in academic discourse and preservation efforts. These sites are not only symbols of industrial progress but also embody the historic relationship between water, land, and human activity, making them unique in comparison to other industrial structures.

Over the past decades, a wide range of large-scale harbours and shipyards across the world have undergone transformations, highlighting a growing interest in their reuse. Some examples in Europe are the NDSM shipyard in Amsterdam, which has become a

creative hub for artists and start-ups, and RDM in Rotterdam, now an innovation district focused on research, education and technology. The Port of Hamburg underwent a large-scale redevelopment project to create a mixed-use urban area, preserving the maritime identity of the docks while meeting modern urban needs. Similarly, Western Harbour in Malmö was transformed from an industrial site into a sustainable residential area, with a focus on waterfront access and public spaces. Outside of Europe, several shipyards in the United States have been repurposed to meet contemporary demands. For example, Hunters Point Shipyard in San Francisco was redeveloped into a mixed-use community, while the Philadelphia Naval Shipyard has become a thriving business campus. These examples demonstrate that there is both interest in and value attached to the redevelopment of shipyards.

This research focuses more on small-scale shipyards, which are particularly sensitive to change due to their size, historical functions, and close ties to their surroundings. Unlike larger shipyards, these sites are more deeply embedded in their local context, they often had an essential role in linking maritime industries with the community. Small-scale shipyards are more susceptible to change due to their inherent vulnerability. Their significance can often be overlooked, as local, small-scale developments may not receive widespread recognition or attention.

The selected examples for the design strategies are selected projects that meet specific criterias:

- The transformation process is partially completed.
- The redevelopment emphasizes sustainability.
- The cultural heritage of the site is preserved.
- The focus is on the interconnected relationship between water, land, and people.

Unlike other industrial sites, shipyards face unique challenges due to their scale, location, and the constant interaction between land and water. Their redevelopment requires careful planning to ensure that the historical identity of these sites is preserved and that new functions are compatible with their maritime past. Given the growing interest in shipyard transformations, developing architectural design strategies for their reuse is essential. Adaptive reuse of these sites should consider not only the preservation of physical structures but also the stories and cultural narratives associated with them. By incorporating heritage values into design strategies, architects can ensure that the maritime identity of these spaces is retained while creating new, functional urban areas.

RQ: What architectural design strategies can be applied for reusing maritime ruins in the Waterdriehoek to preserve the cultural heritage?

The aim of this research is to develop architectural design strategies for reusing historic maritime sites in the Waterdriehoek, ensuring the preservation of their cultural heritage while integrating sustainable and functional urban spaces.

The values of a shipyard

To develop and choose an effective approach for transforming shipyards, architects need to understand the historical and cultural significance of these sites. Historically, shipyards were vital industrial hubs where ships were constructed, repaired, and launched, serving as essential components of maritime trade and defense. However, they were typically closed-off areas, inaccessible to outsiders except during special occasions, such as the launching of important ships. These launches, often covered in local newspapers, became significant communal events, drawing residents to witness the spectacle. This element of exclusivity contributed to the mystique and importance of shipyards in the social fabric of maritime towns and cities. Understanding this context is crucial for architects aiming to preserve the essence of shipyards while adapting them to contemporary uses.

Shipyards consist of more than just a single building; they are complex sites with various structures that evolved over time to meet changing needs. Besides the main hall, where ships were assembled, additional halls and workshops were often used to store and manufacture smaller components that were later installed on the ships (Lintsen, 1993). These components could include everything from metal fittings to wooden interiors, highlighting the variety of skills and craftsmanship required in shipbuilding. The design of these spaces reflects the functional requirements of different shipbuilding processes, with large, open interiors and robust materials capable of withstanding heavy industrial use.

Beyond the buildings themselves, shipyards also featured a range of external structures and equipment essential to their operations. One of the most iconic features of shipyards is the crane. Both small and large shipyards commonly had cranes to handle the heavy lifting involved in shipbuilding. These cranes were often mounted on rails, allowing them to move next to the slipway where ships were constructed and prepared for launch. The presence of these cranes made it possible to lift and transport massive components with precision and efficiency. Today, many of these cranes have been removed, either sold off as valuable equipment or relocated to new industrial sites. However, remnants such as the rails on which these cranes once moved often remain embedded in the ground, providing tangible evidence of the site's industrial past. These traces of industrial activity offer valuable historical markers that architects can incorporate into their designs, creating a narrative link between the site's past and its new function.

One of the most distinctive features of a shipyard is the slipway, a structure unique to maritime industries. The slipway is a sloped platform used for building and launching ships into the water. Unlike other industrial sites, the slipway is directly tied to the water's edge, making it an integral part of the shipbuilding process. This connection between the slipway and the water offers a unique opportunity for architects to create something special during the transformation of a shipyard. The slipway can become a focal point for design interventions that celebrate the site's maritime heritage while offering new functions that engage the community. This relationship has always been central to the identity of maritime towns and cities. Incorporating water-based features such as floating structures, piers, or docks can help integrate the slipway with the rest of the site and create new opportunities for interaction and engagement. For example, floating structures could serve as venues for cultural events, workshops, or exhibitions, providing flexible spaces that adapt to changing

water levels. Piers and docks could be used for recreational activities such as boating or fishing, drawing people to the waterfront and encouraging them to reconnect with their maritime heritage. Incorporating these elements not only preserves the historical significance of the slipway but also enhances the site's functionality in a modern context. By creating spaces that facilitate both cultural engagement and practical uses, architects can ensure that shipyards remain relevant and valuable to contemporary communities. The key is to strike a balance between preserving historical features and introducing new, adaptive uses that meet the needs of present-day users.

Maritime ruins

Maritime sites that have experienced prolonged neglect often exist as fragile, weathered, or partially deteriorated structures. These remnants, whether disused shipbuilding halls, abandoned quays, or skeletal industrial frameworks, form an essential part of maritime heritage. While their original functions may have faded, these ruins continue to hold meaning through their evolving uses. Some remain as passive landmarks, serving as historical markers within the waterfront, while others become informal gathering spaces, offering shelter or unintended interaction between the public and the industrial past. The unique character of waterfronts is partly because of maritime buildings/ruins , these massive volumes with additional cranes, slipways and other attributes dominate the view along when traveling along the water.

One example of a maritime ruin is the Auckland waterfront in New Zealand, where historic industrial elements such as existing silos, crane rails, and shipbuilding halls have been carefully preserved and integrated into a revitalized urban space. Rather than demolishing these maritime structures, the project embraced their industrial character, allowing these structures to serve as visible markers of the area's maritime past.

Preservation and adaptive re-use

This approach focuses on preserving buildings and structures that are still entirely or partially standing, recognizing their historical and cultural significance within the broader urban context. The preservation of these structures is crucial for maintaining the identity of the neighborhood, as they serve as tangible reminders of the area's industrial and maritime past. By acknowledging and integrating vernacular elements, architects can create alterations that resonate with the cultural and historical context of existing structures (Scott, 2008). The vernacular aspects of these buildings, such as their construction techniques, materials, and spatial organization, are deeply rooted in local traditions and practices. Preserving these elements helps maintain a connection to the past while allowing for contemporary adaptations. The primary goal of this strategy is to retain as much of the existing site as possible, ensuring that its historical essence remains intact. However, given the long period of neglect many shipyard buildings have experienced, significant adjustments are often necessary to improve their structural integrity and usability. For instance, buildings may require reinforcement of steel frameworks, replacement of outdated or damaged materials, and upgrades to meet modern safety and energy efficiency standards.

Image 1 and 2.
Transformation of Auckland waterfront

Retrieved from: www.divisare.com

Preserving the exterior envelope of the building is a priority, as it maintains the historical significance and visual identity of the site. Façades, brickwork, and other external elements are restored or repaired to ensure the building retains its original character. Meanwhile, the interior undergoes thoughtful modifications to improve functionality, circulation, and spatial organization (Louw, 2019). These modifications may include the introduction of new steel structures to replace weakened ones, improved insulation for roofs and walls, and the installation of new windows that enhance natural light while preserving the historical appearance of the building. Entirely new constructions, such as mezzanines or additional floors, are also introduced to optimize the building's interior space without compromising its exterior integrity. This approach ensures that the original character of the building remains legible, while the new additions bring a modern and functional aesthetic. For instance, wooden elements may be used to differentiate new structures from existing ones, creating a clear visual contrast that emphasizes the layering of history within the space (Louw, 2019).

An example of this approach can be found in the transformation of an iron foundry in 2023, named Kockums, located in the harbor of Malmö, which was once part of a larger shipyard complex. The exterior of the building remains almost identical to its original state, with brick walls and façade openings showing signs of wear and neglect from years of exposure to the elements. However, significant changes have been made to the interior. Entirely new spaces and installations have been introduced, clearly distinguishable through the use wood and color scheme. The existing steel structure of the building is still visible, but it is overshadowed by the new materials, creating a dynamic interplay between the old and the new.

Another noteworthy example is the NDSM shipyard in Amsterdam, which is under transformation since 2002 from an active shipyard into a vibrant cultural and creative space. The entire site has been opened to the public, allowing visitors to explore its rich industrial heritage. The influence of artists and creatives is clearly visible throughout the site, with murals, sculptures, and installations adding new layers of meaning to the historic structures. Existing buildings have been repurposed as outdoor spaces, with some smaller-scale new buildings introduced within the site to accommodate modern functions. The NDSM shipyard demonstrates that industrial heritage sites can serve as dynamic cultural spaces, where historical structures continue to evolve while preserving their maritime legacy. This approach illustrates how adaptive reuse can transform shipyards into meaningful, multifunctional environments that honor the past while embracing the future.

Material re-use and sustainability

Another strategy that is sometimes used involves demolishing existing buildings or structures and reusing the materials in the new design. This approach is often necessary when the condition of the building is so poor that it cannot be saved, or when the building's location obstructs the overall development of the site, and while the physical location of a historic structure is sometimes secondary to its preservation, the reuse of materials ensures that elements of its historical narrative endure in a new context. However, in cases where spatial relationships contribute to cultural significance, a more site-sensitive approach may

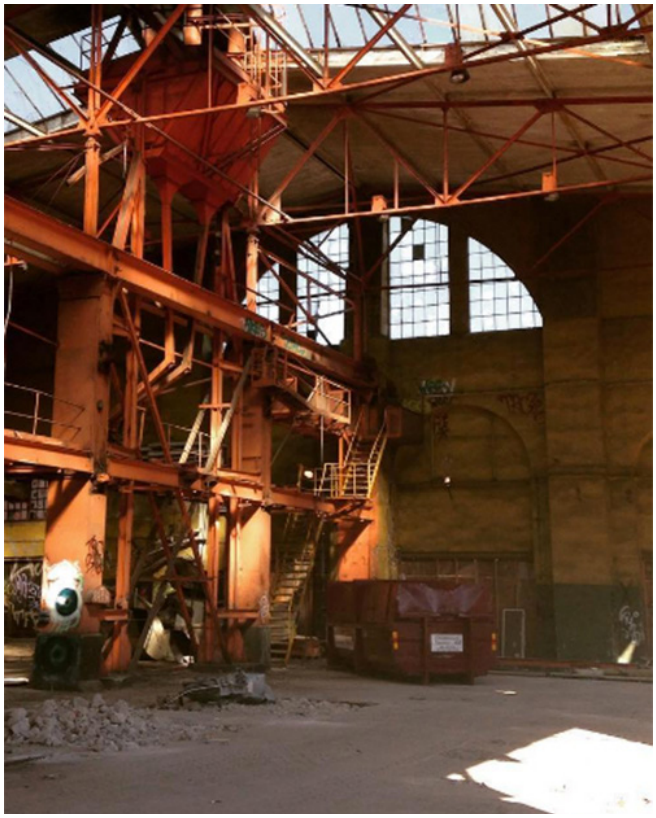

Image 3 and 4.
Transformation of Kockums interieur.

Retrieved from: www.varvsstaden.se

be required. By incorporating these materials into new constructions, architects maintain a tangible link to the original context, which helps to preserve the cultural memory of the site even in a new form (Brooker & Stone, 2018). This approach ensures that the spirit of the shipyard is carried forward, even when physical structures might no longer be there.

Rather than viewing demolition as an act of erasure, this strategy embraces it as a process of transformation. As Scott (2008) argues, the re-use of materials embeds memory into the fabric of new designs, creating a connection between the past and the present. By giving new life to old materials, architects can create spaces that acknowledge the site's industrial legacy while adapting to modern needs. Reusing materials not only honors the original function of the site but also promotes sustainable building practices by reducing waste and conserving resources. This approach aligns with contemporary principles of circular economy, which advocate for minimizing the environmental impact of construction through material reuse and recycling.

This strategy can also be combined with other preservation methods, where part of the original structure is retained, and the rest is selectively removed. In this hybrid approach, some historic elements are kept in situ, while other parts are dismantled, with their materials being repurposed throughout the redevelopment. This balance allows for both conservation and innovation, creating new opportunities for architects to reinterpret the site's legacy. As Webb (2017) notes, demolition does not necessarily equate to loss; when handled thoughtfully, the essence of a site can be preserved through its materials, even if the physical form changes.

A notable example of this approach is the ongoing transformation of the Philadelphia Naval Shipyard since 2000, now known as the Navy Yard. Covering over 1.000 acres, this historic site served as one of America's most important shipyards for over two centuries, primarily for the construction of warships. The site's redevelopment involves a mix of preservation, adaptive reuse, and demolition. While some buildings have been restored and repurposed, others have been demolished to make way for new offices, residential spaces, and public areas. However, rather than discarding the materials from demolished structures, the project incorporates them into the new design. For instance, steel beams and bricks from old shipyard halls are stored and reused across different parts of the site, ensuring that the historical identity of the Navy Yard is not lost but instead woven into its modern iteration.

This careful reuse of materials also helps maintain a sense of place and continuity for the local community. By seeing familiar elements in new forms, residents and visitors can connect with the site's maritime heritage in a meaningful way. The strategy of integrating these materials into new designs creates a narrative continuity that bridges the past and present, allowing shipyards to evolve without losing their historical essence with new volumes. This process demonstrates how maritime heritage can be adapted to meet contemporary needs while preserving the memory of the site's original function. Ultimately, this strategy transforms shipyards into living archives of maritime history, where reclaimed materials maintain a tangible link between past and present.

Storyline and interpretation

Shipyards are not static entities; they evolve in response to shifting industrial needs. Many began as small local enterprises before expanding into major shipbuilding hubs. Over time, their infrastructure adapted, new ship assembly halls were constructed, quays expanded, and older buildings repurposed or removed. These continuous modifications provide a rich narrative of growth, adaptation, and decline, embedding stories within the site itself (Louw, 2019). The architecture of these maritime structures begins by uncovering these layers of history. Architects use archival research, oral histories, and material analysis to piece together the site's evolution, creating a comprehensive narrative of what stood there and why. This process reveals the functions of past structures, from bustling factory halls to quiet storage sheds. It is through this that architects interpret the shipyard's history and assign value to its surviving, and even lost, elements. These layers of the history within the site offer a narrative that guides the architectural interventions (Scott, 2008).

This approach goes beyond the preservation of physical structures; it seeks to preserve the stories embedded within the materials and spaces. For example, a small storage building may be less significant historically than a now-demolished ship assembly hall that was central to the shipyard's operations for decades. By assigning value to each element based on its role in the shipyard's industrial process, architects can make informed decisions about which structures to preserve, adapt, or rebuild. In some cases, even traces of demolished buildings, such as foundations or embedded rails, can be incorporated into new designs showcasing the industrial proces of the past to the present users.

An example of this narrative-driven approach is Royal William Yard in Plymouth, UK. Originally constructed in the 19th century as a key naval supply depot, the yard's evolving role in British naval operations is reflected in its layered history. During its redevelopment in 2007, significant attention was paid to interpreting and preserving the site's industrial narrative. The restoration retained much of the site's original architecture, including stone façades, gates, and internal courtyards. New interventions, such as glass and steel additions, were designed to contrast with the historic fabric while highlighting its past. Public spaces, interpretive signage, and art installations further emphasize the site's naval heritage, ensuring that its historical significance remains central to its new function as a mixed-use space with residential, cultural, and commercial purposes. By embedding both the physical structures and the history they carry into the redevelopment, Royal William Yard exemplifies how using the industrial proces can be used as a guiding principle in the transformation of maritime heritage sites.

Contrast or continuity

The transformation of shipyards requires a careful balance between preserving historical character and introducing contemporary elements. In some cases, contrast is deliberately emphasized, allowing the distinction between past and present to remain visually striking. Aged materials such as rusted steel, weathered wood, and worn brickwork stand in stark opposition to modern interventions, which often feature smooth glass, polished metal, and minimalist finishes. These contrasts highlight the passage of time, making the site's history legible while asserting a new identity. At the same time, some designs seek continuity, subtly

blending the old with the new to create a more cohesive experience. The spaciousness of shipyards, with their expansive halls and towering ceilings, offers opportunities to work within the existing industrial framework while refining its aesthetic. Retaining original shapes—such as vaulted ceilings, steel trusses, and open floor plans—ensures that the space maintains its industrial grandeur. New materials and structures can be designed to echo the geometry and proportions of historic elements, creating a sense of seamless integration rather than stark contrast.

Transformation year Project	2002 NDSM	2000 iladelphia Naval Shipya	2007 Royal Willian yard	2023 Mälmo
Strengths	Maintained the original shipyard's character while repurposing spaces for artists, cultural events, and businesses.	Maintained historic shipyard structures while introducing parks and residential areas to the site.	The beautifull interiors of the existing shipyard have been preserved and adapted for new functions.	Emphasized on energy efficiency, green spaces, and eco-friendly transport.
	Community-driven transformation rather than a top-down master plan.	High-quality public spaces with waterfront promenades and green infrastructure.	Restaurants, public events, and promenades encourage visitor engagement along the waterfront.	Prioritized pedestrian and cyclist access, creating a welcoming environment.
	Public engagement through festivals, street art, and experimental projects.		The site's naval history remains visible in architectural and landscape features.	Transformed the port area into a mixed-use urban disctrict.
			Attracts both local visitors and international tourists through its historic and scenic character.	
Weaknesses	The entire NDSM terrain is fragmented redeveloped resulting that some areas remain underdeveloped, creating a contrast between vibrant and neglected spaces.	The project was divided in multiple phases. Early phases struggling to gain traction, while other phases took decades to redevelop.	Little to no effort was made to retain elements of the former shipyard's working character.	Some of the original maritime structures were removed, reducing the historic character.
	Focus is mainly on commercial and cultural functions, with little housing development.	Primarily catering to high-end businesses, making the area inaccessible to most.		
Specific for Delta Shipyard	Maintaining the original NDSM character while creating spaces for new functions.	Combine the building environment with natural elements and integrate it into a landscape design.	Inspiration for how historic maritime buildings can be repurposed for modern use while retaining character.	Using ecological approaches to preserve the environment and integrate modern elements.
	Using cultural programming as an initial activation strategy.		Encouraging the waterfront through walkways, events, and mixed-use spaces.	Prioritize the slow traffic in the masterplan.

Table 1.
Strengths and weaknesses of the case studies and specific qualities for the Delta Shipyard.

Image 5
NDSM terrain

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www.iamsterdam.com

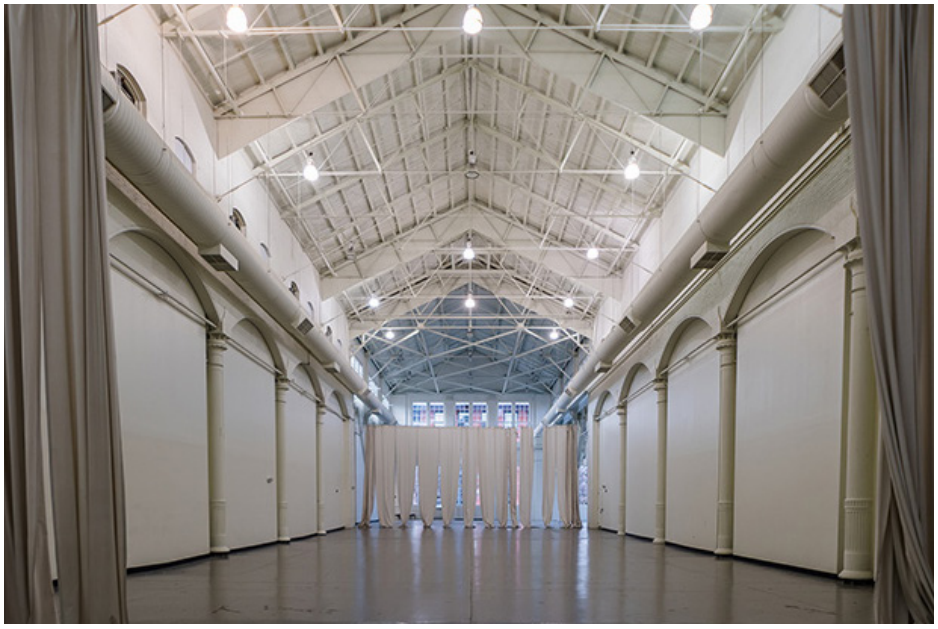

Image 6
Philadelphia navy yard - building 3

Retrieved from:
www.newstudio architecture.com

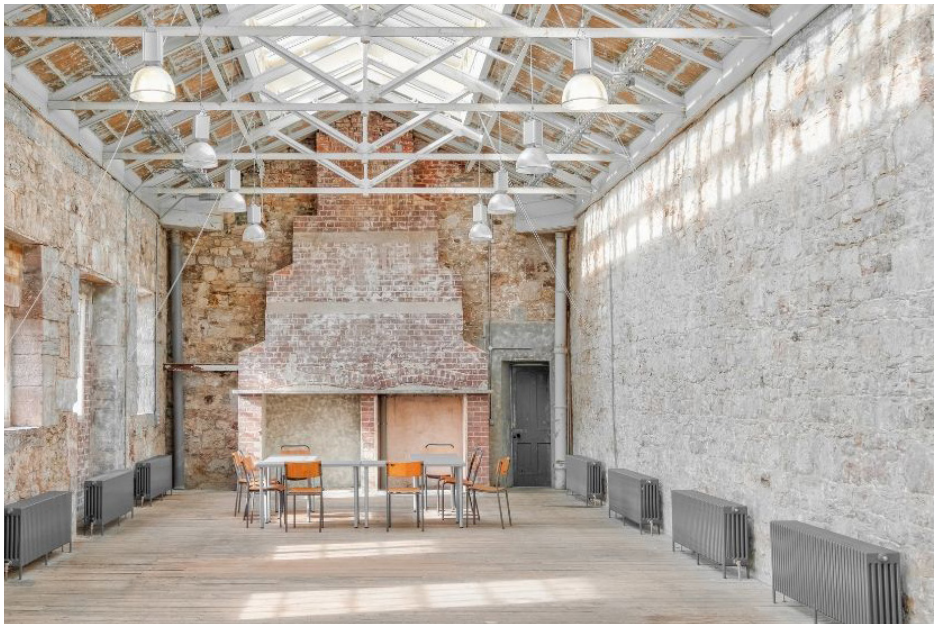

Image 7
Royal william yard

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www.myware
home.com

Image 8
Mälmo

Retrieved from:
www.varvsstaden.
se

Preservation and adaptive re-use

retain historical essence
retain original character
preserve existing structure
contrast old-new

Material re-use and sustainability

reducing waste and conserving resources
part(s) of original structures are retained
re-incorporating salvaged materials
demolition ≠ loss of spirit

Storyline and interpretation

site's historical evolution
valueing survived and lost structures
preserve, adapt, destroy, re-built
embedding stories within the site

Image 9
Design strategies
for maritime ruins

Made by:
Erwin Huisman

Conclusion and discussion

The transformation of shipyards, whether large or small, presents both challenges and opportunities in balancing heritage preservation with contemporary urban development. The scale of the shipyard plays a crucial role in determining the degree of intervention required. Larger shipyards, such as the Philadelphia Naval Shipyard, often demand extensive demolition to repurpose the area for new functions. However, salvaging and reusing materials on-site can mitigate the loss of historical identity while promoting sustainable construction practices.

In contrast, small-scale shipyards like Delta Shipyard in Sliedrecht are deeply embedded in local communities and hold a stronger place-based cultural significance. These sites have historically shaped the economic and social fabric of their surroundings, providing jobs, traditions, and a shared maritime identity. Preserving them is crucial, not only for honoring the past but also for maintaining a sense of continuity for future generations. However, these smaller sites face greater risks of erasure due to:

- Limited documentation and historical recognition, which makes their heritage value harder to justify in large-scale redevelopment projects.
- Competing maritime sites in the same region, leading to the misconception that preserving one is enough to represent the area's industrial past.
- Economic pressures favoring new development, as smaller-scale projects are often seen as less financially viable compared to large mixed-use waterfront transformations.

The comparative analysis of case studies such as NDSM Shipyard, Philadelphia Naval Shipyard, Royal William Yard, and the Malmö Iron Foundry demonstrates that there is no universal strategy for the adaptive reuse of maritime sites. Instead, each transformation requires a site-specific approach that considers historical, architectural, and socio-economic factors. The case studies highlight that the most effective transformations successfully balance preservation with functional adaptation, integrating modern uses while retaining the spatial and material legibility of their industrial past.

The transformation of Delta Shipyard's should not be seen as an isolated project but as part of a broader strategy to preserve maritime heritage sites along the waterdriehoek. By carefully balancing historical conservation with contemporary adaptation, it has the potential to serve as a model for similar sites facing redevelopment pressures. The lessons drawn from the case studies demonstrate that successful maritime heritage transformations require a site-specific, adaptive, and community-centered approach—one that respects the past while ensuring the site remains dynamic and relevant for future generations.

The transformation of maritime sites is not merely about the retention of structures but about redefining their role within the urban and social fabric. Whether through the careful reuse of materials, the reinterpretation of industrial spaces, or the introduction of new functions, the success of these projects depends on their ability to create meaningful connections between past and present. As waterfront redevelopment continues to shape urban environments, ensuring that maritime heritage remains an integral part of this evolution will require a critical, thoughtful, and site-sensitive approach.

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