# THE MARKET

# MARKET RESEARCH AND ANALYSIS

Positioned at the intersection of tradition, innovation, and existential exploration, the concept of space funerals is both novel and steeped in deep-seated human desires and beliefs. This market research explores the potential for a funeral business in space, examining three critical dimensions:

1. **The Consumer Sphere:** The consumer sphere forms the foundational layer of this market research, focusing on understanding consumer behaviors, preferences, and needs related to funeral practices.

2. **The Competitive Sphere:** This layer analyzes existing and emerging players within the funeral industry, the space funeral industry, as well as space businesses more broadly, to assess market competition and identify potential collaborators or competitors.

3. **The Political Sphere:** This section of the research explores the current legal framework governing space activities, including international treaties, national regulations, and emerging policies related to space exploration, space commercialization, aviation, the use of airspace, and general information on funeral regulatory.

Together, these dimensions offer a comprehensive understanding of why LERO funeral services might tap into a unique niche market with significant growth potential.

# 1 THE CONSUMER SPHERE

## 1.1 Universally Relevant Market Insights

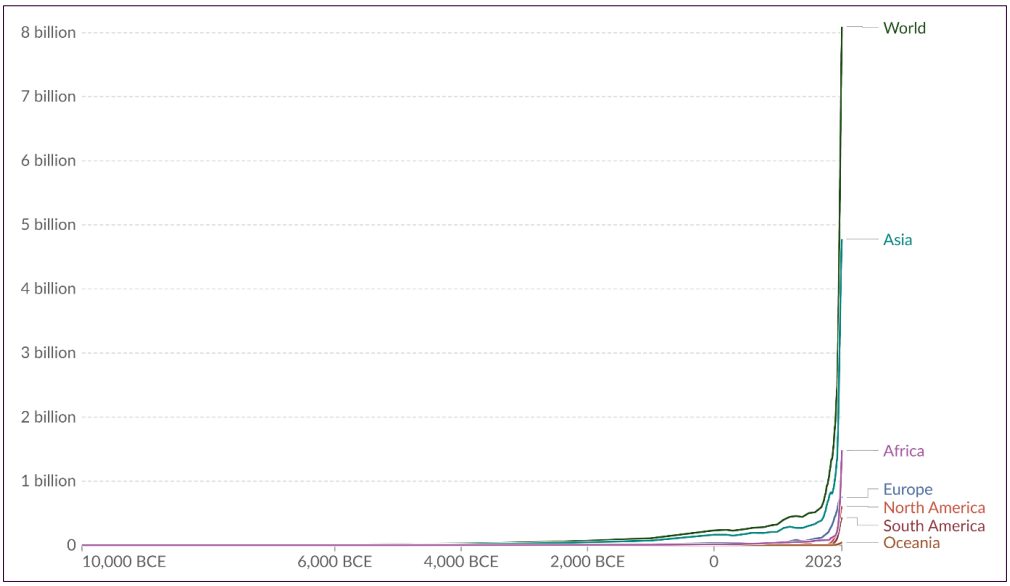
By examining current demographic trends, innovation-driven countries, and global consumer behaviors, this research provides insight into the evolving demands of an **aging population**, often referred to as the 'Silver Economy'. As life expectancy increases and societal attitudes towards death and memorialization change, there is a growing demand for personalized and innovative funeral solutions. This section explores how these shifts might drive interest in space as a unique final resting place, supported by an analysis of mega, macro, and consumer-focused global trends anticipated to shape the funeral industry in 2024 and beyond.

### 1.1.1 Demographic Data

#### Demography of the World Population

As the graph below shows, the global population has continuously grown to this date, with a particularly noticeable exponential increase in recent decades.

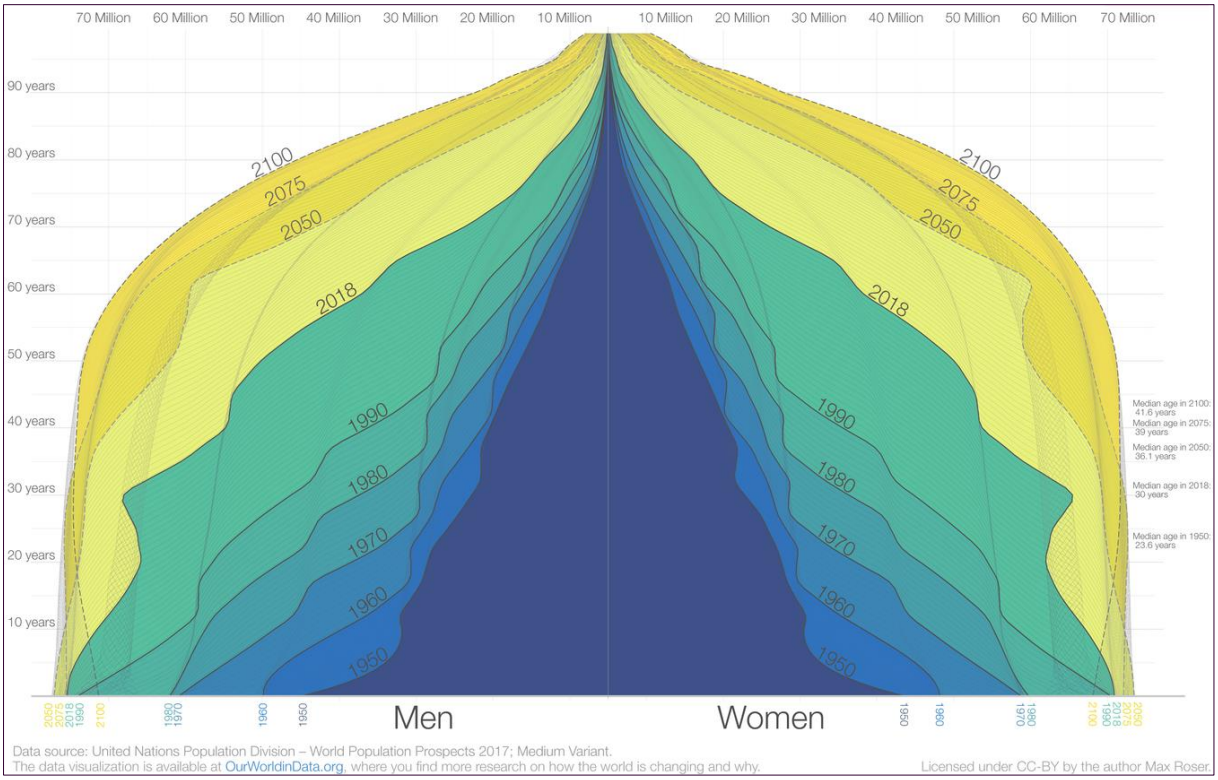
*Fig. 6: Population, 10,000 BCE to 2023*




*Source: https://ourworldindata.org/grapher/population*

Accordingly, life expectancy at birth has increased, and child mortality has decreased, contributing to further population growth, as illustrated by the population pyramid below (Roser, 2019; UN WPP 2024).

*Fig. 7: The Demography of the World Population from 1950 to 2100*




*Source: https://ourworldindata.org/global-population-pyramid*

The 2018 green population pyramid reveals that the tapering above the base is significantly less pronounced compared to 1950, indicating a decline in child mortality rates. When comparing the base of the 2018 pyramid with the projections for 2100, it becomes evident that future demographic trends will diverge from past patterns: projections indicate that fewer children will be born at the end of this century than are born today, resulting in a narrower base of the future population structure.

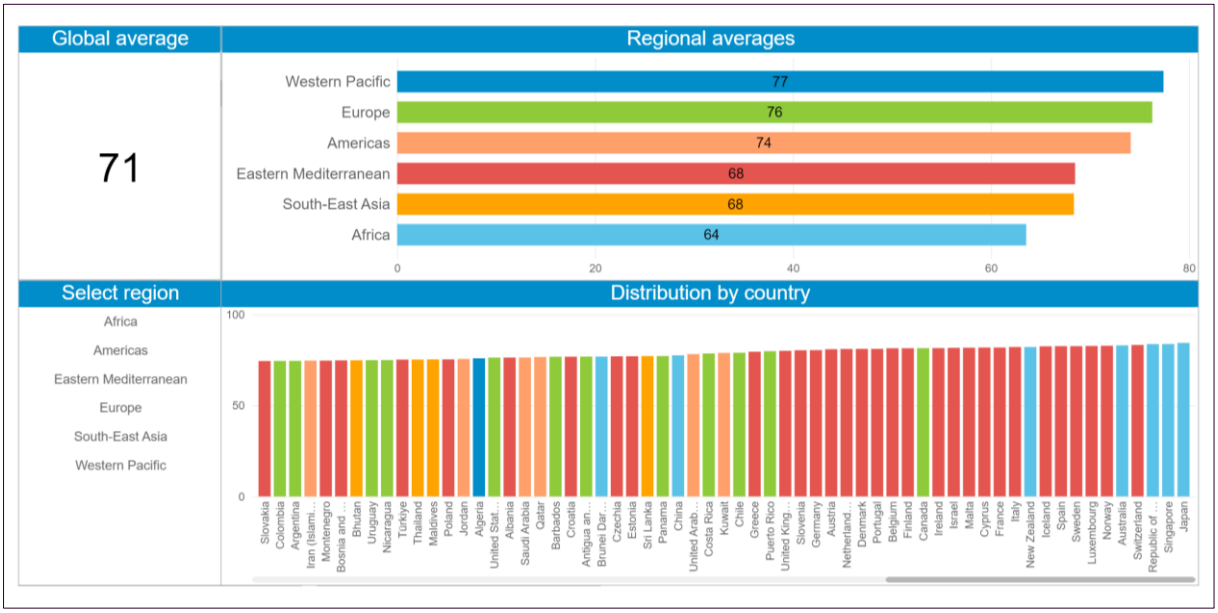
We are currently at a pivotal moment in global population history. From 1950 until the present, the expansion of the entire pyramid – driven by an increase in the number of children – has been the primary factor behind global population growth.

Moving forward, it is not the expansion of the base but rather the **'filling up' of the population above the base** that will drive demographic changes: the number of children is expected to increase only marginally before beginning to decline, while the number of individuals in the working-age and elderly cohorts is projected to rise substantially. With improvements in global health and declining mortality rates, the current population is expected to achieve unprecedented longevity. (Roser, 2019)

## Life Expectancy at Birth

In accordance with the population pyramid, the World Health Organization (WHO) has published recent data confirming the overall increase in average life expectancy at birth. As the graphs below indicate, the **global average life expectancy has reached 71 years**. Globally, the countries with the highest life expectancies are located in Asia, followed by European countries. (2024)

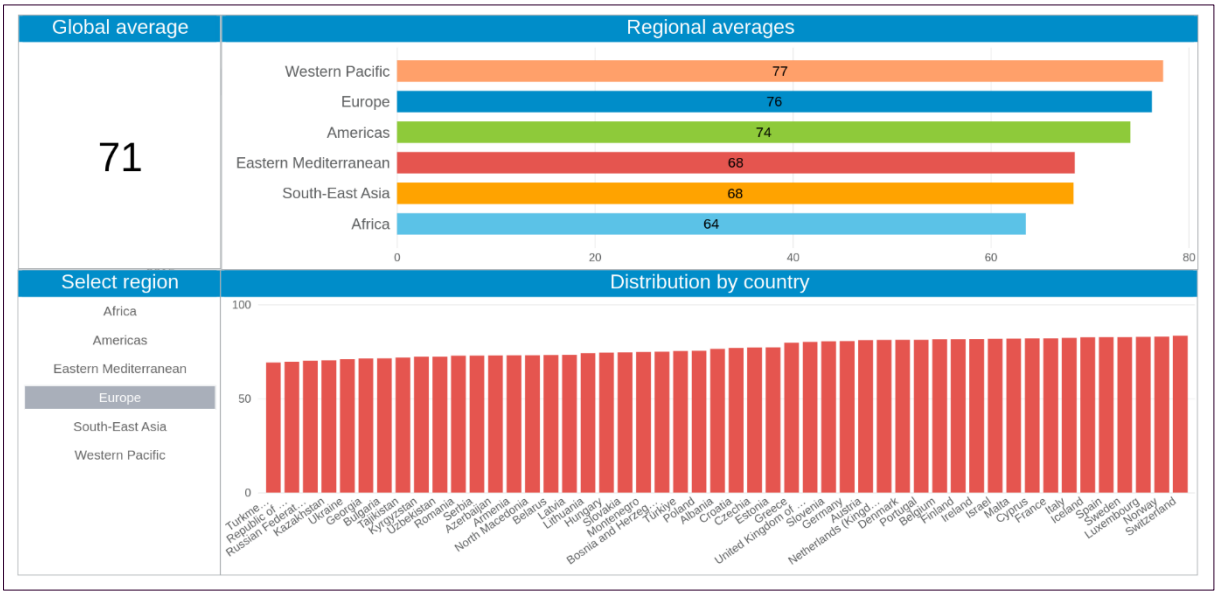
*Fig. 8: Life Expectancy at Birth (Years). Latest Year, Both Sexes, All Regions*




*Source: (showing an extract of the highest global life expectation)* *https://www.who.int/data/gho/data/indicators/indicator-details/GHO/life-expectancy-at-birth-(years)*

Focusing on Europe, the highest life expectancies are found in Northern European nations, with Switzerland at the top, followed by Norway, Luxembourg, and Sweden (WHO, 2024).

*Fig. 9: Life Expectancy at Birth (Years). Latest Year, Both Sexes, European Region*

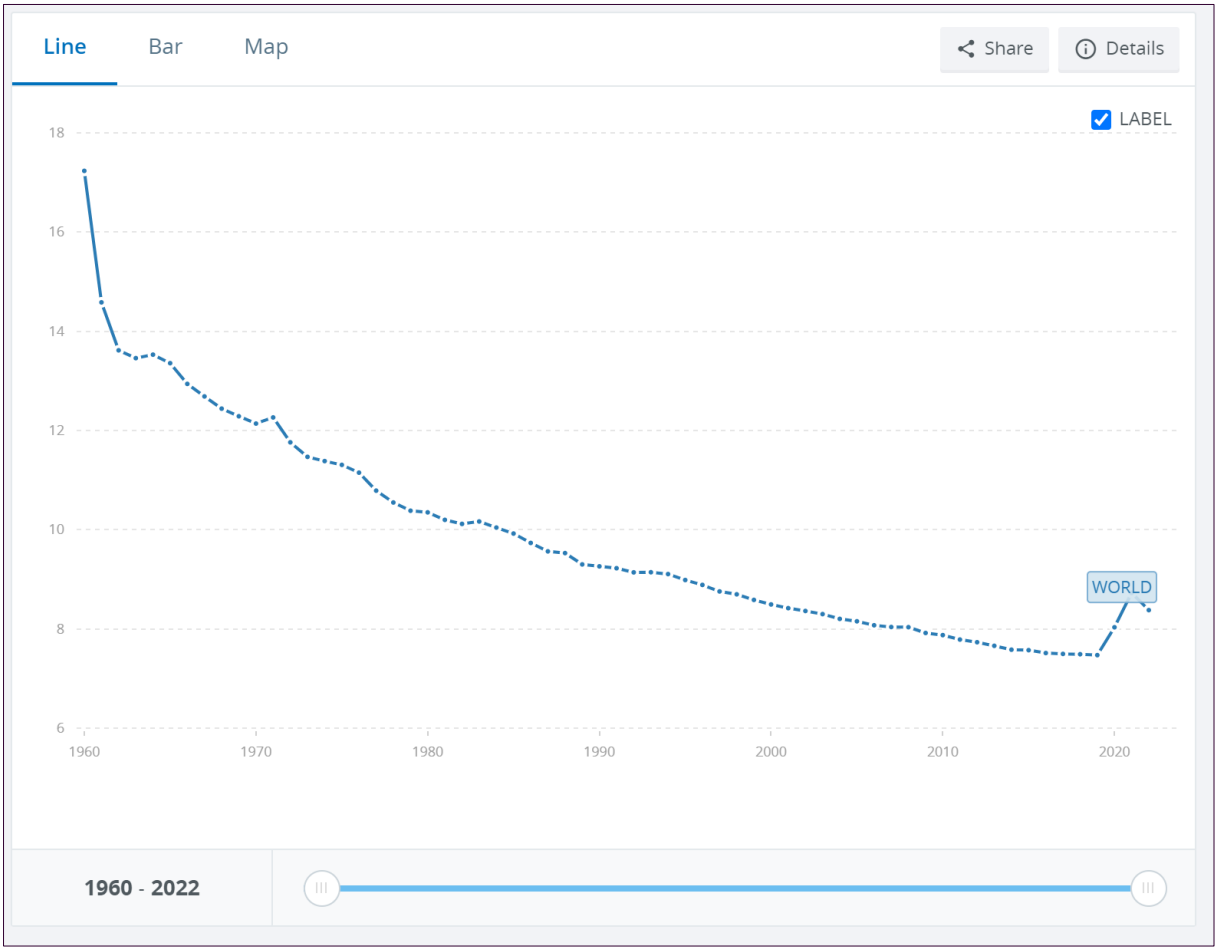



*Source: (showing Europe as selected region)* *https://www.who.int/data/gho/data/indicators/indicator-details/GHO/life-expectancy-at-birth-(years)*

## Death Rates, Deaths, and Age Structure of the Deceased

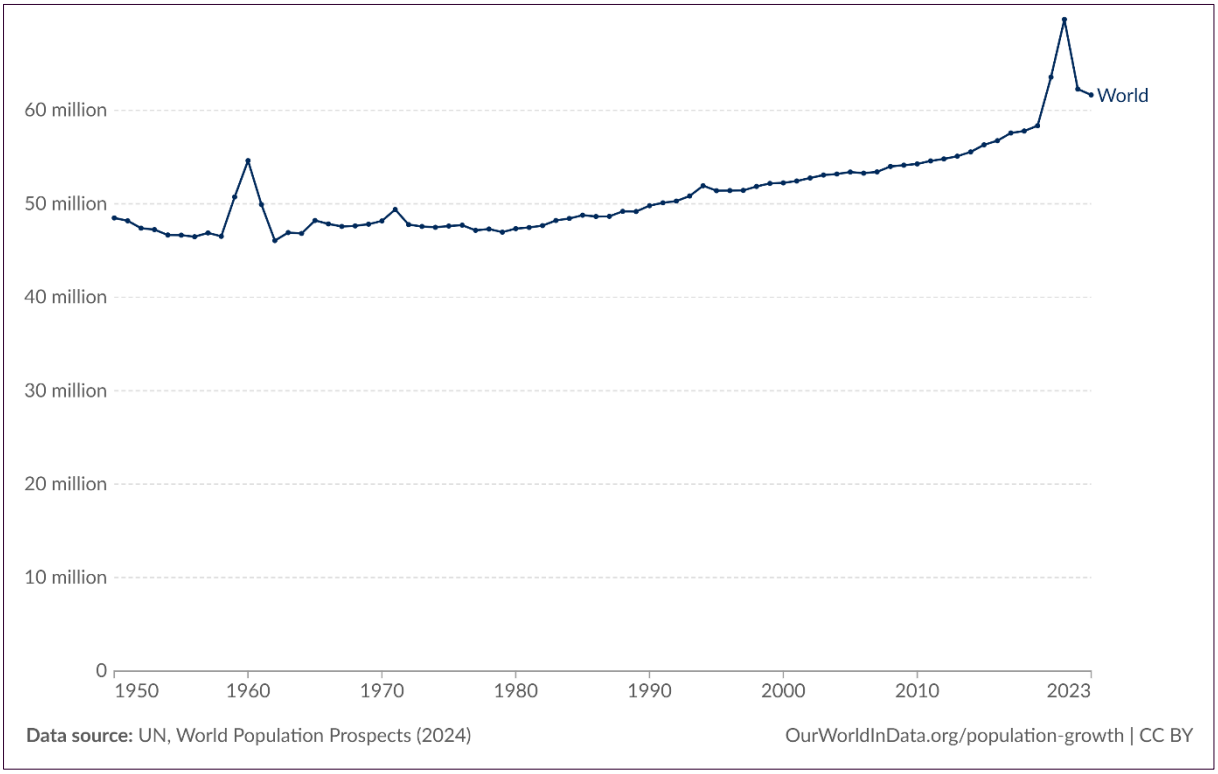
Even though the worldwide death rate has constantly diminished in the past decades (with exception of a peak in 2021, presumably due to COVID-19 pandemic), the nominal number of deaths has increased from roughly 48 million in 1950 to 62 million in 2023, as the following graphs highlight:

*Fig. 10: Death Rate, Crude (per 1,000 People)*




*Source: Death rate, crude (per 1,000 people)* https://data.worldbank.org/indicator/SP.DYN.CDRT.IN

*Fig. 11: Deaths, 1950 to 2023*



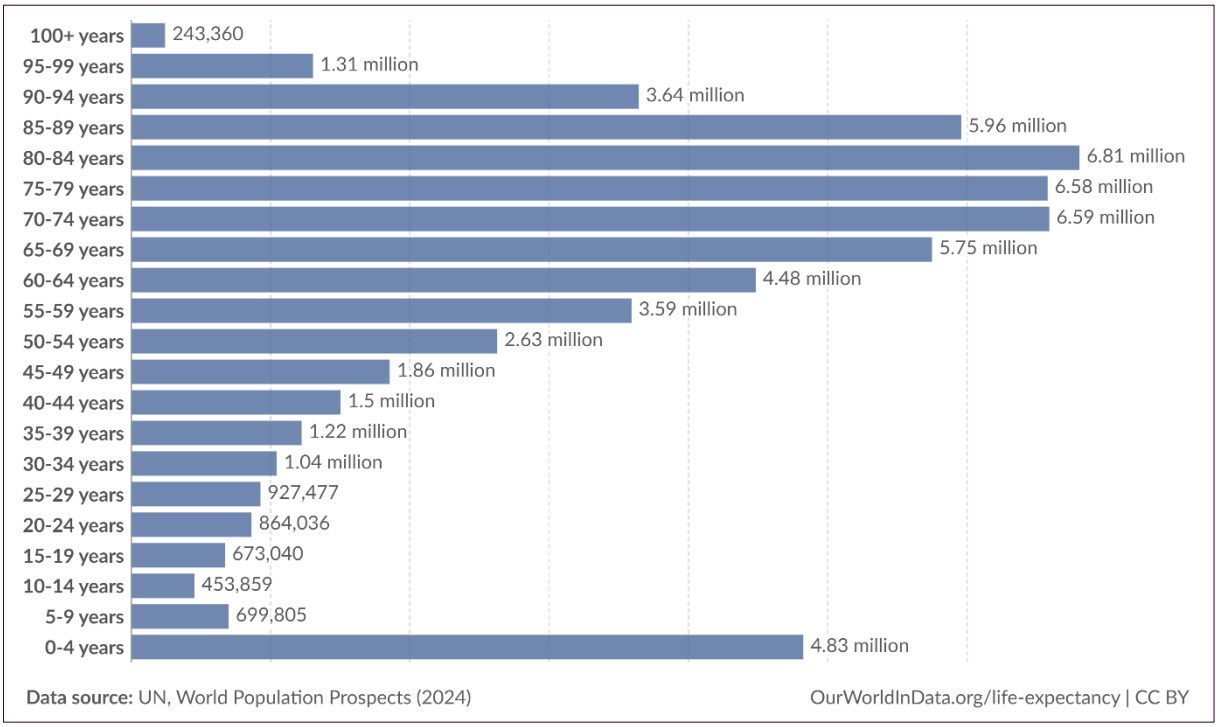

*Source: https://ourworldindata.org/explorers/population-and-demography?time=earliest..2023&facet=none&country=~OWID_WRL&Metric=Deaths&Sex=Both+sexes&Age+group=Total&Projection+Scenario=None*

According to an analysis by the UN published in the World Population Prospects 2024, this development will remain unchanged in the upcoming decades, as

**"The world's population is expected to continue growing over the coming fifty or sixty years, reaching a peak of around 10.3 billion people in the mid-2080s"** (p. 1).

As the following graph shows, most passings in 2023 have occurred with age 65 upwards:

*Fig. 12: Number of Deaths by Age, World, 2023*




*Source: https://ourworldindata.org/grapher/annual-deaths-by-age*

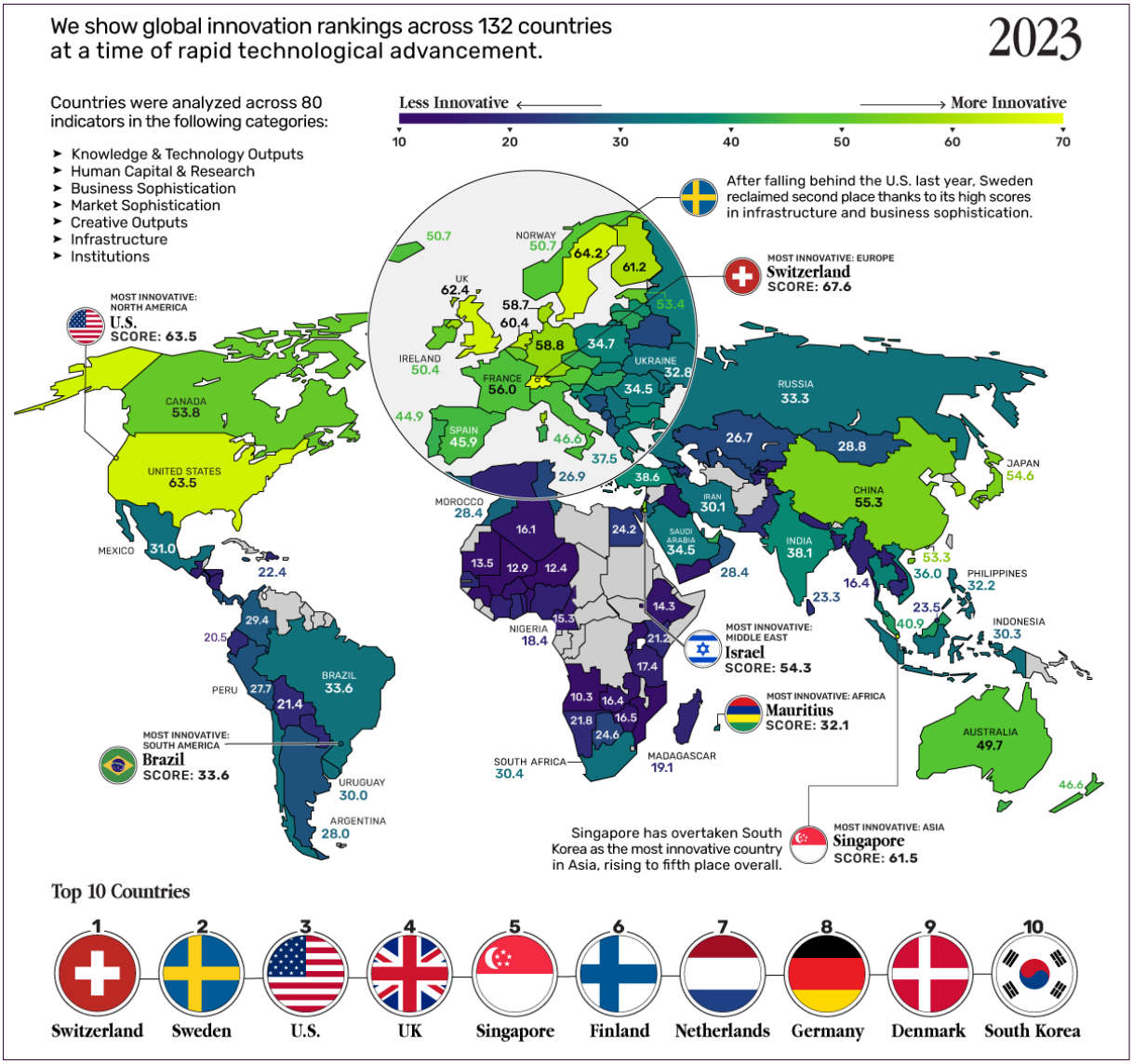
Based on a thorough analysis of the demographic data, it is evident that life expectancy is increasing, and the global population continues to grow. This trend suggests that the number of elderly individuals will rise significantly, leading to a greater demand for end-of-life services. Consequently, **the need for funeral services is expected to increase substantially** in the coming years, highlighting the importance of preparing for and addressing this emerging demographic challenge.

### 1.1.2 Innovation-Driven Countries

The concept of sending human remains into space as a final resting place is likely to gain demand in countries where innovation and development are prioritized. This trend is expected because such countries typically embrace new technologies and ideas more readily, fostering environments that are open to novel approaches to traditional practices. These nations often have robust technological infrastructure and a culture that values and invests in pioneering solutions. (Dutta et al., 2023) As space technologies become more accessible and the costs associated with space endeavors decrease, the appeal of space funerals as a unique and innovative way to honor the deceased is likely to resonate more with those who live in societies that celebrate cutting-edge developments and futuristic aspirations.

Following these assumptions, this chapter presents figures that show a ranking of the most innovative countries in 2023, along with a comparison over the past five years, based on the Global Innovation Index established by the World Intellectual Property Organization (WIPO).

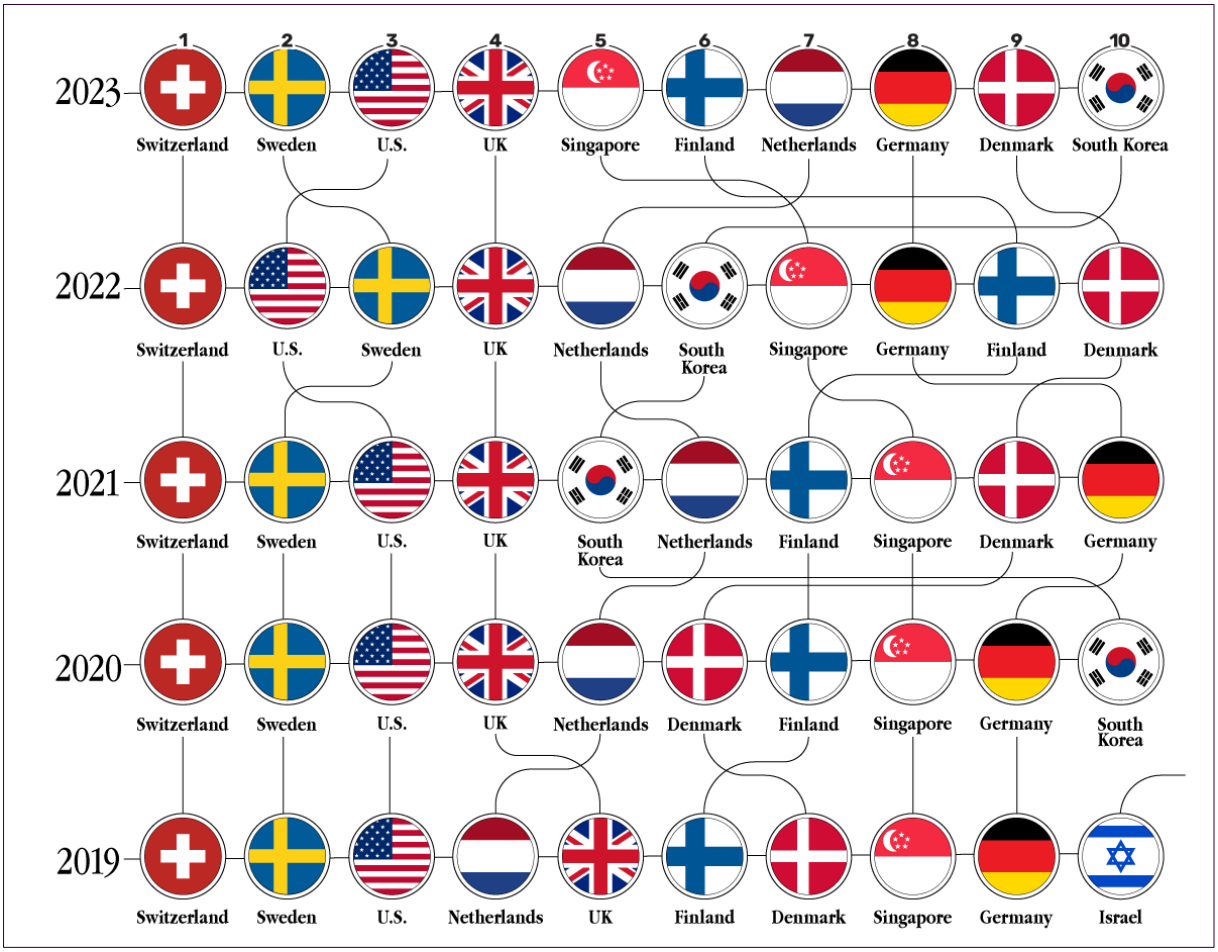
*Fig. 13: Global Innovation Index 2023*




*Source: Conte, N. (2023). Ranked: The Most Innovative Countries in 2023. https://www.visualcapitalist.com/most-innovative-countries-in-2023/*

As shown in the world map above, Switzerland tops the ranking, followed by Sweden and the United States. These three countries have also dominated the innovation landscape in recent years, as the following list demonstrates:

*Fig.14: Top Global Innovators 2019 – 2023*




*Source: Conte, N. (2023). Ranked: The Most Innovative Countries in 2023. https://www.visualcapitalist.com/most-innovative-countries-in-2023/*

In summary, this trend underscores the role of these countries as key drivers of technological advancement and novel practices, making them potential geographical targets for the space funeral business.

### 1.1.3 Global Consumer Trends 2024 and Beyond

Drawing on various publications discussing megatrends, macrotrends, consumer trends, and their implications for 2024 and beyond, several key developments are anticipated to shape the coming years. For businesses to succeed, it is essential to understand the current and future focus of populations, companies, and individuals worldwide. While the following major trend lines are an excerpt and not explored in exhaustive detail, they provide important anchor points for understanding emerging developments within the specific funeral sector, as elaborated in chapter 1.3 of The Market section.

#### Megatrends

Megatrends are large, transformative global forces that impact the economy, society, culture, and the environment over the long term (Naisbitt, Urdene, 1990). Some of the key megatrends are:

**Technological Disruption:** Continued rapid advancements in AI, machine learning, and big data are revolutionizing industries. Automation, robotics, and the integration of AI in daily life will accelerate, reshaping jobs, economies, and societies.

**Sustainability and Climate Action:** The urgency of climate change is driving a shift toward sustainability in all sectors. Renewable energy, circular economy models, and carbon neutrality are becoming critical priorities for businesses and governments.

**Demographic Shifts:** Aging populations in developed countries, along with population growth in developing regions, will impact labor markets, healthcare, and economic strategies. The rise of Gen Z and their distinct values will also influence the consumer landscape. (PwC, 2022)

#### Macro Consumer Trends

Macro consumer trends are broad, long-term shifts in consumer behavior and interests that unfold over several years or even decades. These trends are considered 'big picture' themes and

are often leveraged to guide strategic business decisions. Companies use them to identify target markets, assess profitability and market potential, and shape innovation strategies. (Becker, 2016) Some of the key macro trends include:

**Experience Economy:** Consumers are prioritizing experiences over material goods. This trend is driving growth in sectors like travel, entertainment, and wellness experiences, where personalized and immersive offerings are valued. As highlighted in the trend report by Euromonitor International, companies that provide "Delightful Distractions" (2024) focus on successfully creating memorable, binding experiences with their customers.

**Personalization and Customization**: There is a growing demand for personalized products, services, and experiences. Consumers are increasingly looking for options that allow them to tailor offerings to their preferences. Companies that provide customized solutions, whether through AI-driven recommendations or personalized marketing, are well-positioned to succeed. This trend is particularly noticeable in traditional consumer sectors such as fashion, beauty, and technology, where brands offer personalization options for items like sneakers, skincare routines, and gadgets. (Accenture Interactive, 2018; Harvard Business Review, 2018; McKinsey & Company, 2021)

**Value Over Price:** The "Value Hackers" (Euromonitor International, 2024) trend highlights how inflation is driving consumers, including middle-income groups, to seek maximum value without sacrificing quality. Surprisingly, middle-income consumers in advanced economies are not just cutting back; they are splurging on experiences, groceries, and luxury goods at rates similar to high-income individuals. Businesses are advised to cater to this trend by offering affordable options, loyalty programs, and clearly communicating value propositions to attract these cost-conscious yet splurging consumers. (McKinsey & Company, 2024)

**Sustainable Consumption:** Consumers are increasingly eco-conscious but skeptical of corporate environmental claims. While many prioritize sustainability, economic challenges have shifted focus, especially among younger generations. In 2024, fewer Gen Zer's and millennials in Europe and the U.S. consider sustainability crucial or are willing to pay extra for eco-friendly products. Businesses must now emphasize genuine, transparent, and affordable sustainability practices rather than relying on greenwashing tactics to meet consumer expectations. (McKinsey & Company, 2024)

**Inclusivity First:** Companies are increasingly expected to embrace inclusivity, community engagement, and ethical responsibility as core components of their brand identity. Consumers are shifting towards brands that prioritize individuality and authenticity, reflecting a broader economic trend away from rigid, traditional structures. This evolution emphasizes the importance of flexible, personalized experiences that resonate with personal values and foster a sense of belonging, aligning with the rise of personalized spirituality and the demand for socially conscious offerings across demographics. (Accenture Interactive, 2018; Euromonitor International, 2024; Pew Research Center, 2023)

**Embracing Phygital:** As the global economy continues to evolve with the shift towards digital (Euromonitor International, 2024; McKinsey & Company, 2024), the integration of physical and digital experiences is becoming increasingly prevalent. This "phygital" approach is revolutionizing consumer interactions, with technologies like augmented reality (AR) and virtual reality (VR) enhancing the way people engage with products and services. This blending of the physical and digital realms is not just a trend but a significant driver of innovation and economic transformation. (France, 2022; Holman, 2024)

The insights provided in this chapter emphasize the significant shifts in global demographics, innovation trends, and consumer behavior, all of which are reshaping the funeral industry. As populations age and life expectancy rises, there is a growing demand for personalized and innovative end-of-life solutions. Countries that prioritize technological advancement and embrace novel ideas are poised to lead in offering unique funeral services, such as space burials. Furthermore, emerging global consumer trends, such as the experience economy and customization, align with the increasing desire for distinctive, memorable memorialization options. These developments are set to redefine the future of the funeral sector.

## Close-Up: The Silver Economy

According to “The Silver Economy” report published in 2018 by the European Commission, Silver Economy is defined “as the sum of all economic activity that serve the needs of people aged 50 and over, including the products and services they purchase directly and the further economic activity this spending generates.” (p.6) This includes a wide range of industries such as healthcare, financial services, housing, transportation, and technology. The primary focus is on products and services that enhance the quality of life, independence, and well-being of the elderly, while also addressing the broader societal challenges of an aging population.

As life expectancy increases and birth rates decline (see chapter 1.1 of The Market section), an increasingly larger proportion of the population is entering the senior age bracket. This demographic shift is creating significant economic impacts, as this group becomes a dominant force in the market, with substantial purchasing power and specific needs. In fact, the economic impact and market growth potential are huge. (McKinsey & Company, 2024)

The Silver Economy is already a multi-trillion-dollar market. In Europe alone, the spending power of individuals over 50 years old is so vast that, if they formed their own country, it would be the third-largest economy globally (Rothschild & Co., 2023). This demographic is contributing significantly to consumer spending, particularly in sectors like healthcare, housing, travel, and consumer goods.

**The 60-plus age group is the fastest-growing consumer segment worldwide, with their spending expected to represent nearly 60% of consumption growth in Europe and Asia from 2015 to 2030, and about 50% in North America.** (Rothschild & Co., 2023)

## 1.2 In the Heads and Hearts of the Consumers

This section of the research explores the **psychological and spiritual dimensions of grief**, focusing on how individuals from various cultural and religious backgrounds approach death and bereavement. By examining the psychological aspects of grief, including the importance of maintaining farewell rituals, continuing bonds with the deceased, and the challenges posed by disrupted grieving processes, this research aims to identify how the funeral industry can offer meaningful and supportive services, particularly in the context of space funerals.

Additionally, this section analyzes the demographic profiles and traditional funeral practices of the world's major religions – 'the Big Five': Christianity, Islam, Hinduism, Buddhism, and Judaism – highlighting the diverse ways people honor and remember the deceased. Special attention is given to the **'Spiritual but Not Religious' (SBNR) movement**, which reflects a shift towards more individualized and non-traditional spiritual practices.

Understanding these diverse perspectives is crucial for identifying potential customer segments interested in space funerals, thereby resonating with the emotional and spiritual needs of individuals and families.

### 1.2.1 Psychological Aspects of Grief and Bereavement

Grief and bereavement involve complex emotional responses to the loss of a loved one, with funerals and rituals playing a crucial role in this process. As Mitima-Verloop, Mooren, and Boelen (2019) note, "death is usually followed by a funeral service" (p. 1), regardless of cultural, traditional or religious adherence. Both religious and non-religious practices of honoring the deceased are deeply intertwined with the human psychological response to the trauma of loss and the experience of mourning. This chapter provides a brief overview of some of the most important psychological dimensions of mourning and coping with death.

## The Importance of Performing a Grief Ritual

**Why funerals anyways?** Funerals traditionally serve as both an endpoint and a starting point. They mark the transition from life to death, certifying this passage as complete, and allow survivors to begin their journey of recovery and renewal. The phrase 'funerals are for the living' underscores the primary purpose of these grief rituals: to provide comfort, closure, and a means for the bereaved to express their pain and receive support. (Kastenbaum, 2004)

During the time after a death, the funeral becomes the place where family and friends can say goodbye to the deceased and pay their respects (Søfting, Dyregrov, and Dyregrov, 2016). A funeral often acts as a reunion of friends and family, creating a natural opportunity for individuals to receive counseling and support from familiar faces (Draper, Holloway, and Adamson, 2014).

Death rituals have "been at the core of virtually all world cultures" (Kastenbaum, 2004, p. 5), emphasizing the role they play in connecting the living with the dead. A key element to a society's survival is its willingness to perform these rituals, which help individuals navigate the social changes brought on by death. Overall, the purpose of a funeral is to meet the social needs of understanding these changes, celebrating and remembering the deceased, promoting unity among survivors, and allowing the expression of deep emotions. (Long, Buehring, 2014; Irwin, 2015)

## The Importance of Continuing the Bond

The ability of funerals to fulfill the bridging role between the living and the dead can be compromised (Kastenbaum, 2004). Many people are not ready to completely sever ties with the deceased, reflecting a strong need for what has been termed "continuing bonds" (Klass and Walter, 2001).

The **Continuing Bonds Theory**, as this concept is scientifically known today (Root & Exline, 2014), highlights this need for bereaved individuals to maintain an "ongoing inner relationship with the deceased" (Stroebe & Schut, 2005). This ongoing connection can take various forms, including, for example, direct, interactive communication with the deceased (Hopf et al., 2022). One common method of maintaining this connection is through active memorialization. According to Smith (1996), the memory of a person is extended beyond the lifetimes of those who knew

them personally. This process honors the life that has ended by keeping their memories alive, allowing them to continue to live on in the minds of others (Long, Buehring, 2014; Irwin, 2015).

### The Importance of Time

The passing of time plays a significant role in adapting to loss. Time allows for new learning experiences and opportunities, which help the bereaved figure out how to live without the deceased (Larsen, Hybholt, & O'Connor, 2024).

However, time alone does not lead to overcoming a traumatic death experience. As Stroebe and Schut (1999) state, **"In the course of time, after sufficient, perhaps repeated exposure and confrontation, there may no longer be a need to think about certain aspects of the loss. Habituation has taken place"** (p. 216). To achieve a newly structured day-to-day life without the deceased, active confrontation with the situation over time is essential.

### The Importance of the Funeral 'Done Right'

Funerals do not always help overcome the pain of a grieving person (Kastenbaum, 2004). In fact, people might have negative experiences attending a funeral or memorial service or avoiding it upfront (Corr, 2015). One crucial aspect in the 'successful' implementation of a funeral service lies in **understanding and meeting the attendees' expectations towards the funeral**. As an empirical study conducted by Mitima-Verloop, Mooren, and Boelen reveals, a positive perception of the funeral service positively affects the grieving process in the first months after the loss (2019).

Additionally, some research suggests that **for participants to be positively impacted by a funeral ritual, they need to be actively engaged in the process**; otherwise, they may not find satisfaction in the experience (Hayslip et al. 2007). Thus, one can conclude from this study that the degree of an individual's involvement in a funeral is directly linked to the overall effectiveness of the ritual – an important consideration for the memorial business, as building trust in funeral services is vital for ensuring customer satisfaction.

## 1.2.2 The Five World Religions and Their Demographics

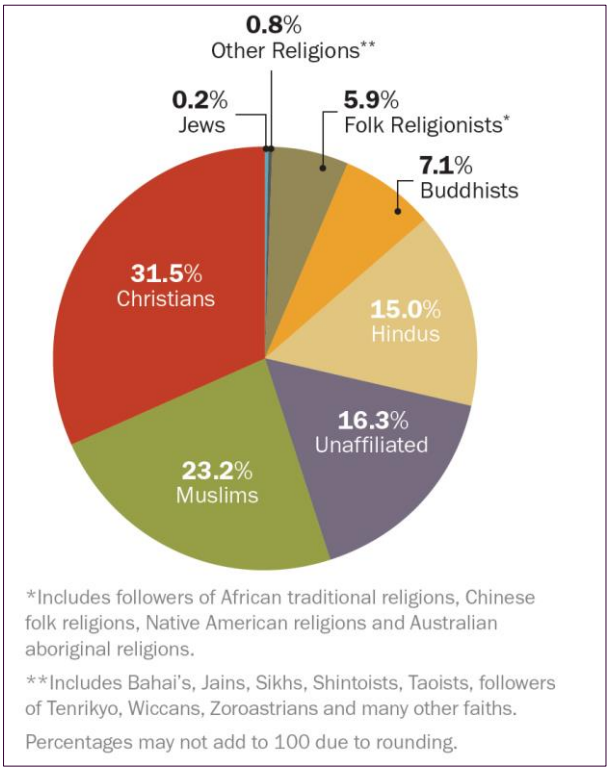
LERO does not explicitly in- or exclude people with specific religious adherence or beliefs. Since grief and the dealing with death are deeply intertwined with religious beliefs and traditions (Long, 2009), this chapter analyzes the religious landscape around the globe.

### Demographic Overview

According to a demographic study conducted by the Pew Research Center's Forum on Religion & Public Life there are 5.8 billion religiously affiliated adults and children around the globe, **representing 84%of the 2010 world population of 6.9 billion**. (For more recent data on the world population, please refer to chapter 1.1 of The Market section).

2.2 billion Christians (32% of the world's population),1.6 billion Muslims (23%) 1 billion Hindus (15%), nearly 500 million Buddhists (7%) and 14 million Jews (0.2%) around the world.

*Fig. 15: Size of Major Religious Groups, 2010 (Percentage of the Global Population)*




*Source: https://www.pewresearch.org/religion/2012/12/18/global-religious-landscape-exec/*

At the same time, the new study by the Pew Forum also finds that roughly one-in-six people around the globe (1.1 billion, or 16%) have no religious affiliation. This makes the unaffiliated the third-largest religious group worldwide, behind Christians and Muslims, and about equal in size to the world's Catholic population. Surveys indicate that many of the unaffiliated hold some religious or spiritual beliefs (such as belief in God or a universal spirit) even though they do not identify with a particular faith.

### A Closer Look into the Unaffiliated

The religiously unaffiliated include atheists, agnostics and people who do not identify with any religion in surveys. However, many of the religiously unaffiliated have some religious beliefs. For example, belief in God or a higher power is shared by 30% of French unaffiliated adults and 68% of unaffiliated U.S. adults. Some of the unaffiliated also engage in certain kinds of religious practices. For example, 27% of unaffiliated adults in the United States say they attend religious services at least once a year. And in China, 44% of unaffiliated adults say they have worshiped at a graveside or tomb in the past year.

### How Religious Groups are Distributed Geographically

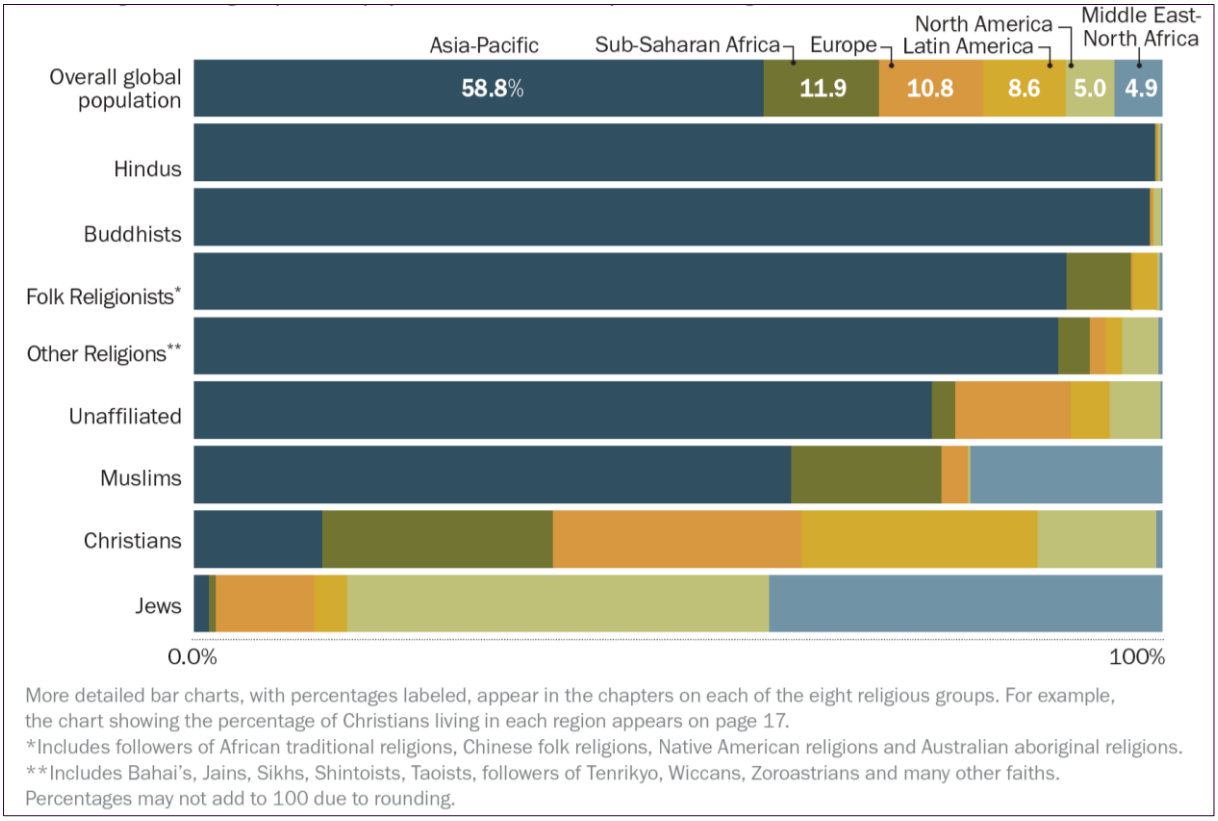
The geographic distribution of religious groups varies considerably. Several religious groups are heavily concentrated in the Asia-Pacific region, including most Hindus (99%), Buddhists (99%), adherents of folk or traditional religions (90%) and members of other world religions (89%).

Three-quarters of the religiously unaffiliated (76%) also live in the massive and populous Asia-Pacific region. Indeed, the number of religiously unaffiliated people in China alone (about 700 million) is more than twice the total population of the United States.

The Asia-Pacific region also is home to most of the world's Muslims (62%). About 20% of Muslims live in the Middle East and North Africa, and nearly 16% reside in sub-Saharan Africa.

Of the major religious groups covered in this study, Christians are the most evenly dispersed. Roughly equal numbers of Christians live in Europe (26%), Latin America and the Caribbean (24%) and sub-Saharan Africa (24%).

*Fig. 16: Geographic Distribution of Religious Groups (Percentage of Each Group's Total Population that Lives in Particular Regions)*




Source: https://www.pewresearch.org/religion/2012/12/18/global-religious-landscape-exec/

### 1.2.3 Overview of Funeral Rituals and Practices of the World's Major Five

As highlighted in the Pew study, religious adherence significantly influences the lives of much of the world's population. Below is an overview of the traditional funeral practices of the five major world religions – Buddhism, Christianity, Hinduism, Islam, and Judaism (listed alphabetically).

#### Buddhist Funeral Practices

Early Buddhists adopted the Indian practice of cremation, following the tradition set by the Buddha's cremation. This practice remains common today. After death, the body should not be touched unless necessary, as it is believed the soul does not immediately depart. The body is typically left undisturbed for four days before being prepared for cremation or burial. The preparation involves washing the body and dressing it in simple clothing, reflecting the Buddhist focus on modesty. (Rinpoche, 2024)

Monks are present at the funeral to perform chants that aid the deceased's spirit in transitioning to the next life. During the ceremony, Buddhists offer sacrifices to the monks as an act of goodwill, hoping to gain assistance for the deceased in their reincarnation journey. (Keown, 2013) While attendees may pay their respects, mourning is discouraged as it does not alter the deceased's fate. Overall, these customs aim to support the deceased's reincarnation and generate good karma for the living through acts of selfless service. (Morris, 2008)

#### Christian Funeral Practices

Upon the death of a Christian, there is no strict funerary practice that must be followed. Instead, the rituals vary based on the circumstances and location. (Long, 2009) Christian funerals aim to dispose of the body, but the methods differ according to personal preference. For instance, while some families entrust the preparation of the deceased for burial to a funeral director, others might choose to stay with the body. (Long, 2009)

Christian funerals emphasize two main points: first, the deceased's ultimate belonging to the family of God rather than to an earthly family, aligning with the biblical view that all are children

of God. This reflects the belief in the soul's return to God. Second, the focus is on the body of Christ, symbolizing Christ's sacrifice, which offers hope for the deceased. (Stortz, 2014)

However, Christian funerals are increasingly shifting from religious ceremonies to more personalized and experiential events. As a result, religious beliefs are becoming less central to how Christian funerals are conducted and how the body is laid to rest. (Long, 2009)

### Hindu Funeral Practices

Hindu funeral customs, rooted in religious beliefs and cultural norms, focus on reincarnation and aiding the soul's journey to the afterlife. (Filippi, 1996) A key ritual is 'Antyesti', or 'Last Rites', where the body is bathed, dressed in simple clothing (white for men, red or traditional colors for married women), and adorned with flowers. 'Puja' may be performed, and offerings like rice balls (pindas) are placed near the body, with holy water, often from the Ganges, sprinkled over it. (Rukmani, 2017)

Cremation is the preferred method, symbolizing the soul's release from the body, and the funeral pyre is typically lit by the eldest son or closest male relative. The ashes are usually immersed in a sacred river, often the Ganges, to help the soul reach Moksha (liberation). (Filippi, 1996)

After cremation, the 'Shraddha Ceremony', performed on the 10th or 13th day, includes offerings to ensure the soul's transition. Families observe a mourning period, lasting 10 to 13 days, during which they abstain from social events. (Filippi, 1996) Annually, 'Pitru Paksha' is observed to honor ancestors, and after the mourning period, families conduct a purification ceremony before resuming regular life. (Rambachan, 2003)

### Islamic Funeral Practices

Islamic tradition holds that if a body is not properly buried, the soul cannot find eternal rest (Coward, 1997; Ross, 2001). It is customary to bury a Muslim on the same day as their death, unless it occurs late in the day (Lobar, Youngblut, & Brooten, 2006). Though the Qur'an does not

outline funeral practices, traditions have evolved based on beliefs about death, the afterlife, and resurrection (Kassis, 1997; Greenberg, 2007).

Near death, Muslims are positioned to face Mecca, and the shahada is recited to help them enter Paradise (Lobar, Youngblut, & Brooten, 2006; Hewer, 2006). After death, the body is washed by same-sex individuals under a sheet for modesty, starting with the right side and washed an odd number of times with water and perfumed leaves. (Ross, 2001)

The body is then wrapped in cotton shrouds and placed in a wooden coffin. The funeral, led by a relative, is held at home or in a mosque, where 'salat al-janaza' prayers are recited asking for God's mercy. After debts are settled, the body is buried loosely in the ground facing Mecca. While wailing is not permitted, crying is allowed, and in some cases, women may not be present at the burial or visit the grave. (Lobar, Youngblut, & Brooten, 2006)

### Jewish Funeral Practices

Judaic funeral practices focus on caring for both the body and the mourners (Riemer, 1995). Many Jewish individuals believe the soul begins its return to heaven immediately after death, so burial is usually done as soon as possible, often before sundown on the day of death (Clements et al., 2003). The body, seen as the vessel of the soul, is treated with great respect and care (Lobar, Youngblut, & Brooten, 2006).

A practice called 'Shemirah' involves a family member or friend keeping vigil over the body until burial (Clements et al., 2003). The body is washed and dressed in a white linen shroud by the 'Chevrah Kadisha', a Jewish burial society (Bowker, 2003). It is neither embalmed nor cremated but placed in a simple wooden casket, allowing natural decomposition (Clements et al., 2003).

Mourning begins with 'Aninut', a period of intense grief where the family focuses on burial arrangements, free from usual responsibilities (Rubin, 2014). After burial, the mourners tear their clothing, symbolizing the deep sorrow that has torn their lives apart (Clements et al., 2003).

Understanding the psychological and spiritual dimensions of grief, as well as the cultural and religious diversity surrounding death, is essential for providing meaningful funeral services. This chapter has explored the importance of rituals, continuing bonds, and the role time plays in the grieving process. It also highlighted how the major world religions and spiritual movements shape individual perspectives on memorialization. By recognizing these emotional and spiritual needs, the funeral industry, including space funerals, can offer more personalized and compassionate services that resonate with a diverse range of consumers.

## Close-Up: The 'Spiritual But Not Religious' (SBNR) Movement

The SBNR movement encompasses individuals who seek personal spiritual experiences outside the framework of organized religion. These individuals often believe in a higher power or spiritual forces but do not subscribe to specific doctrines, rituals, or institutions associated with traditional religions. (Song, 2022)

**Demographics**

- **Growth:** The number of people identifying as SBNR has grown significantly in recent years, particularly among younger generations (Millennials and Gen Z), young-minded Westerners, and in highly educated groups. (Song, 2022)
- **Age:** Younger adults are more likely to identify as SBNR compared to older adults. Pew Research indicates that about 27% of U.S. adults under 30 identify as SBNR. (2023)
- **Geography:** The SBNR trend is more prevalent in Western countries, especially in the United States, Canada, and parts of Europe, where secularization is on the rise. (Song, 2022)

**Beliefs and Practices**

- **Beliefs:** While SBNRs often reject formal religious doctrines, many hold spiritual beliefs such as the existence of a higher power, the importance of personal growth, and the interconnectedness of all life.
- **Practices:** Many engage in practices like meditation, yoga, mindfulness, or other forms of spiritual expression. Some explore spirituality through nature, art, or personal relationships rather than through religious services or communities.

**Attitudes Toward Religion**

- **Critique of Organized Religion**: A common feature among SBNRs is a critical view of organized religion, often citing issues like hypocrisy, dogmatism, or institutional corruption. Many feel that traditional religions do not adequately address their spiritual needs or reflect their values.
- **Individualism**: SBNRs place a strong emphasis on personal autonomy and the freedom to explore spirituality in a way that is meaningful to them, rather than conforming to established religious norms.

(Sun, 2022)

**A Glimpse into the Psychological Profile of SBNRs**

Research suggests that conventional religiosity is strongly associated with personality traits such as agreeableness and conscientiousness. In contrast, individuals who identify as SBNR tend to exhibit higher levels of openness to experience but lower levels of agreeableness and conscientiousness. Studies also show that those with a social-oriented personality are more likely to adhere to conventional religious practices, whereas those with a focus on individuality often challenge or reject traditional religious norms. (Fuller, 2018)

## 1.3. Current Worldwide Trends in Funeral Practices

Innovation in contemporary funeral practices is driven by two key factors: first, a business-related dimension, where services are adapted based on financial considerations and technological advancements; and second, the influence of consumers, who are the primary force pushing funeral practices into the modern era. (Beard and Burger, 2017) This section provides insights from a consumer-centric perspective, emphasizing the role of customers at the heart of the funeral business.

In chapter 1.1 of this section, consumer trends were already outlined. This chapter focuses specifically on how these broader behavioral trends are influencing the funeral industry. Contemporary funeral practices reflect the same key themes discussed earlier, mirroring wider sociocultural, environmental, and technological shifts. These insights offer a deeper understanding of how these trends are shaping both individual experiences and societal norms surrounding death and memorialization.

### 1.3.1 The Rise of Cremation

**Definition and Technologies**

The Cremation Association of North America (CANA) defines cremation as “the mechanical, thermal, or other dissolution process that reduces human remains to bone fragments. Cremation also includes processing and pulverization of the bone fragments into pieces that are usually no more than one-eighth inch in size” (2024). 0.125 inches convert into approximately three millimeters.

While most people associate cremation with the burning of a body after death, there are now cremation methods that go beyond flame-based processes, including the use of water. However, the newer technology, called ‘alkaline hydrolysis’, also known as ‘bio-cremation’, ‘aquamation’ or ‘water cremation’, is currently available only in a few regions worldwide. (Reuters, 2023)

The following paragraphs refer to the flame-based cremation technology, where cremated remains are ultimately returned to the family members, who may choose to keep them, bury them, or scatter them, depending on the deceased's wishes (World Population Review, 2024).

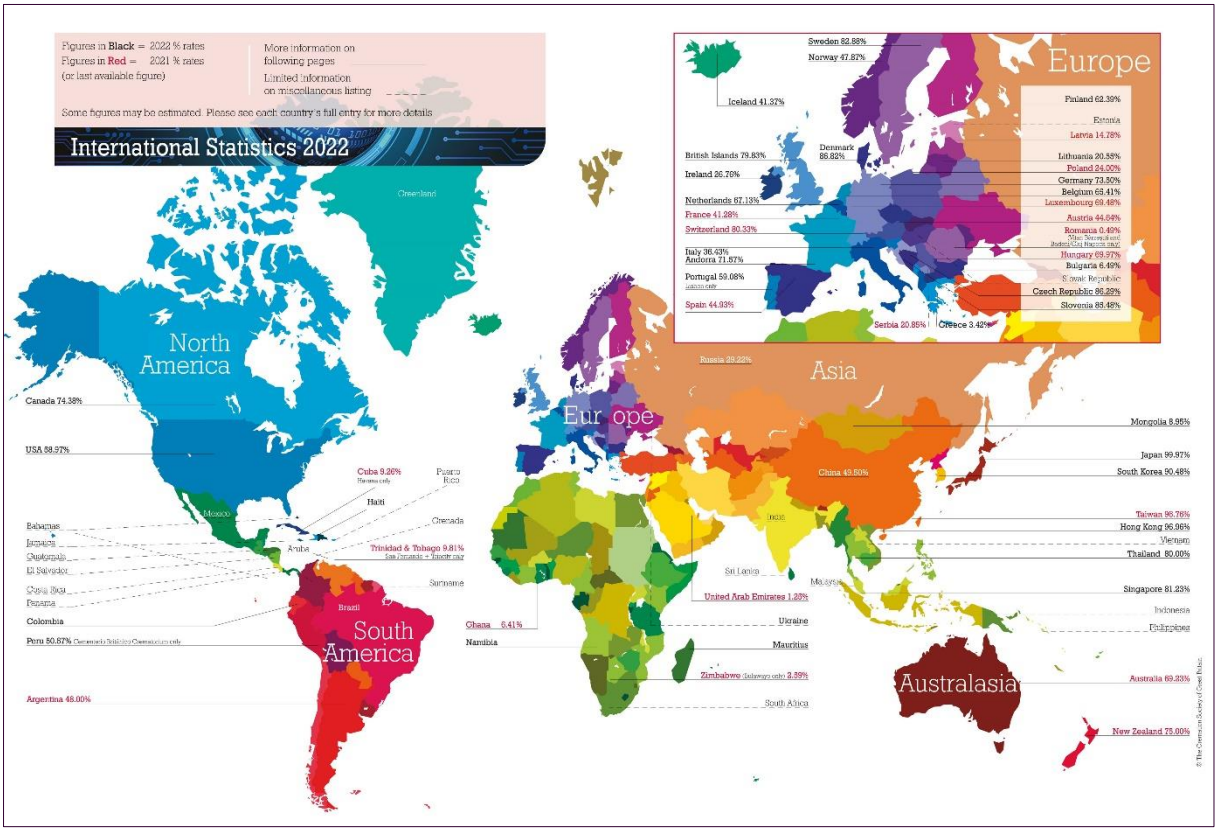
### Global Popularity of Cremation

Cremation is one of several global funeral practices, and the choice is often influenced by cultural, religious, financial, and personal factors. Consequently, cremation's popularity varies significantly across the globe. In regions where religions like Buddhism and Hinduism are prevalent, cremation rates tend to be higher, as these faiths permit and often encourage the practice. On the other hand, religions such as Islam, Orthodox Judaism, and the Greek Orthodox Church generally prohibit cremation, leading to lower cremation rates in countries with large populations adhering to these faiths.

### Countries with Highest and Lowest Cremation Rates

As of 2019, according to The Cremation Society, Japan holds the highest cremation rate, with nearly all deaths (99.97%) resulting in cremation. Other countries with high cremation rates include Taiwan, Hong Kong, South Korea, and Switzerland, where rates range from 82.95% (Sweden) to 96.76% (Taiwan). Conversely, countries like Greece, Ghana, Mongolia, Lithuania, and Russia report some of the lowest cremation rates. For instance, Greece had a cremation rate of just 0.63%, while Russia’s rate was 15.21%.

*Fig. 17: Cremation Rates Worldwide (in Percent)*




*Source: https://www.cremation.org.uk/International-cremation-statistics-2019*

## Cremation Rates Within Countries

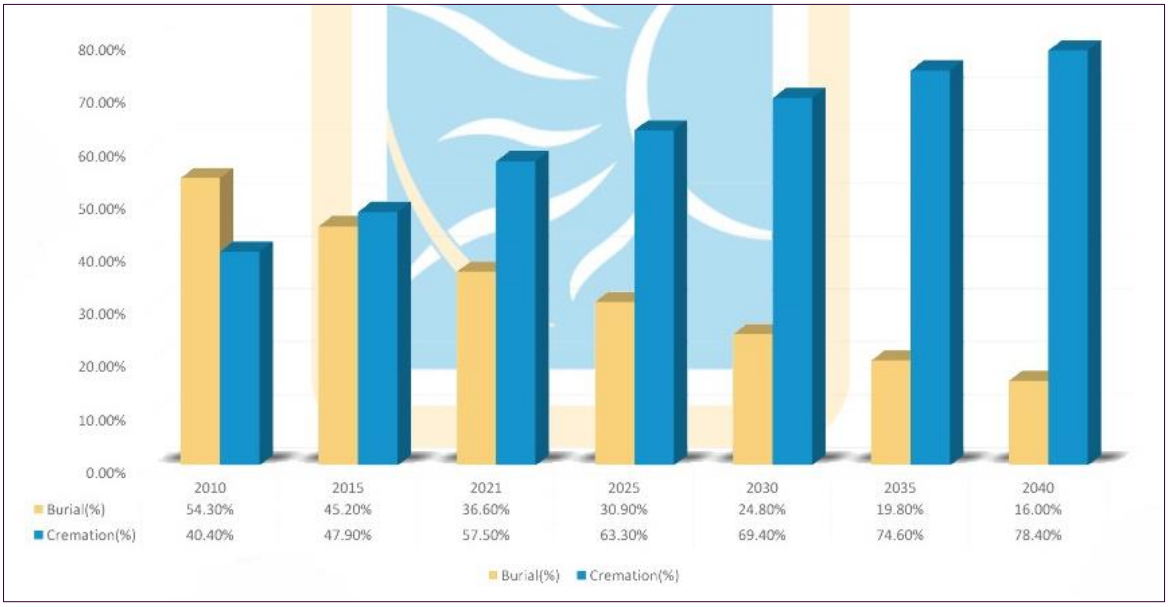
Cremation rates within countries can differ. In places like Russia and the United States, urban areas tend to have higher cremation rates compared to rural regions. Demographics also play a role, as younger generations may opt for cremation more frequently than older individuals, as seen in South Korea, where younger citizens have higher cremation rates than those over 60. (World Population Review, 2024)

## Cremation vs. Burial

In modern, Westernized societies, where traditional burial was once the preferred funeral practice, this ritual appears to be in decline. Recent studies indicate that cremation has surpassed

traditional burial as the most common method of body disposal, with this trend continuing to grow. (Worldmetrics, 2024) As the graph below indicates, the U.S. National Funeral Directors Association has predicted that traditional burials will most likely vanish by the end of the current century.

*Fig. 18: Historic Rates and Future Projections of Cremation and Burial in the US*




*Source: https://www.nationalcremation.com/cremation-information/why-is-cremation-becoming-more-popular-in-the-us*

The reasons for the increasing preference for cremation are manifold. The following chapter delves into the latest developments on how funeral practices are currently perceived by consumers.

### 1.3.2 Today's Funeral Practices: A Mindshift

#### Personalization and the Celebration of Life

The trend toward personalized funerals reflects broader cultural shifts that emphasize individualism and the need for rituals that resonate personally with those left behind. Christian funeral practices, for example, are actively shifting from strictly religious ceremonies to more experimental, personalized experiences. Instead of focusing primarily on religious beliefs, the practice

is evolving into a celebration of life through memorialization and extravagant representations of personal and social preferences (Long, 2009). This move toward personalization is a reaction against the 'one-size-fits-all' model of traditional funerals. The emphasis on unique, individualized ceremonies allows mourners to find personal meaning in the ritual, which can aid in the grieving process. (Rumbold, Lowe, and Aoun, 2021)

### Environmental Considerations

The increasing popularity of eco-friendly funeral options, such as green burials, human composting, and water cremation, can be understood within the broader context of environmental ethics. These practices align with contemporary ecological consciousness and the desire to minimize one's posthumous environmental impact. The adoption of these practices is also part of a growing movement towards 'sustainable death care', which seeks to reconcile meaningful death rituals with environmental responsibility. (Yang, 2023)

### Technological Integration in Death Practices

The integration of technology in funerals – ranging from livestreamed services to digital memorials – reflects a broader trend of digitization in all areas of life. Scholars in the field of digital anthropology have examined how online spaces are becoming increasingly important for mourning and memorialization. Researchers highlight how digital platforms allow for continuous interaction with the deceased's memory, thereby transforming traditional practices of remembrance and grief. (Sas et al., 2019)

### Death Positivity and Evolving Attitudes Towards Death

The **Death Positivity Movement**, which encourages open discussions about death, represents a significant shift in societal attitudes. This movement challenges the traditional taboo surrounding death and promotes a more integrated approach to end-of-life care. Studies in thanatology suggest that this movement helps individuals cope better with mortality and loss by normalizing

death as part of the human experience. The rise of initiatives such as death cafes and the increasing popularity of death doulas are fostering healthier approaches to death and dying. (Incorvaia, 2024)

### Pre-Planning and the Psychological Impact

In line with the Death Positivity Movement, the trend toward pre-planning funerals is often associated with psychological benefits for both the individual and their family. Research in psychology and behavioral sciences indicates that pre-planning can reduce anxiety about death, provide a sense of control, and ease the emotional and financial burden on survivors. These findings align with broader research in stress and coping, which emphasizes the importance of preparedness in managing end-of-life issues. (Russell-Jones, 2024)

The global funeral industry is evolving in response to both practical and deeper societal needs. Trends such as the rise of cremation, personalization, eco-friendly options, and technology reflect broader cultural, environmental, and psychological shifts. As these changes shape consumer expectations, funeral providers must adapt to offer innovative and compassionate services that resonate with modern values and preferences.

## Close-Up: The Pet Aftercare Market

According to Fortune Business Insights (2024), the global pet care market has seen significant growth over the past decade. In 2023, the market was valued at USD 246.66 billion and is project-ed to grow from USD 259.37 billion in 2024 to USD 427.75 billion by 2032, demonstrating a com-pound annual growth rate (CAGR) of 6.45%.

North America, particularly the United States, remains the largest market, followed by Europe. Emerging markets in the Asia-Pacific region, such as China and India, are also experiencing rapid growth, driven by rising disposable incomes and increasing pet adoption rates.

One of the key segments of the market includes pet services, such as pet sitting, boarding, training, and daycare. The rise in pet-friendly policies and the increasing number of pet hotels have contributed to the expansion of this segment.

**Insights on the Relationship Between Humans and Pets**

More people now view pets as family, leading to increased spending on pet care and rising pet ownership, particularly in smaller families and single-person households. Pets offer emotional support, especially valuable for those living alone or socially isolated, such as the elderly. This shift in perception, recognizing pets as sentient beings with emotions, has led to stricter animal welfare regulations and more advocacy for animal rights. (Fernandes et al., 2023; Global Animal Law, 2024; Steklis et al., 2023)

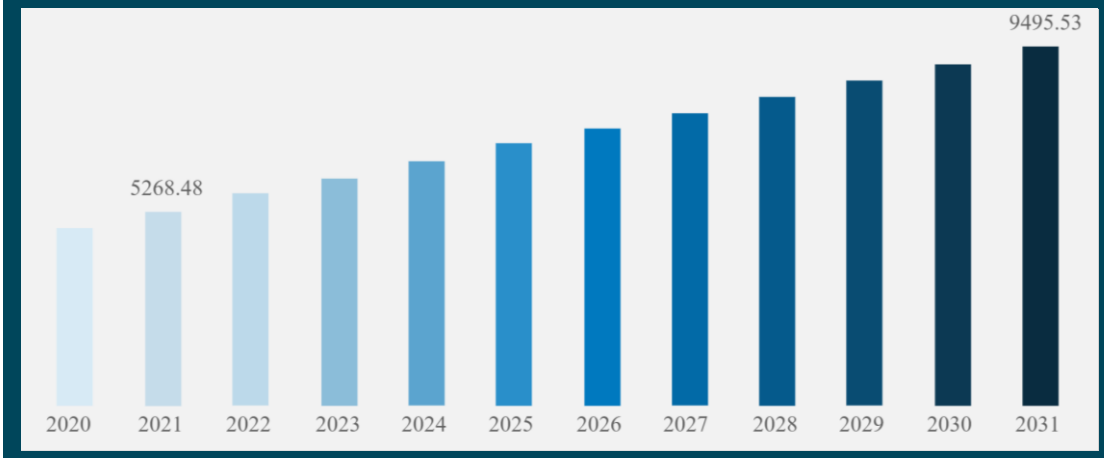
**The Loss of a Pet**

The death of a companion animal can deeply affect older adults, with grief often comparable to losing a human loved one. Despite this, the emotional impact of pet loss is frequently overlooked. To cope, former pet owners may reminisce about happy memories or engage in activities to honor their pets. Acknowledging this grief and offering support can improve the well-being of older individuals. (Brown et al., 2023)

**Implications for the Pet Aftercare**

The pet funeral market, a subset of the larger pet care industry, is continuously growing. The market includes services like cremation, burial, and memorials, with offerings such as caskets, urns, and online remembrance platforms. Consumers increasingly seek personalized and unique memorial options that reflect the individuality of their pets. Many companies in this market offer customization services, allowing pet owners to engrave names, dates, and even personalized messages on memorial items. The emotional connection between humans and their pets has fueled demand for diverse and sentimental pet memorials, contributing to the market's expansion and diversification. (Business Research Insights, 2024)

*Fig. 19: Global Pet Memorials Market Size, 2031 (USD Million)*




*Source: https://www.businessresearchinsights.com/market-reports/pet-memorials-market-109848*

The International Association of Pet Cemeteries & Crematories (IAOPCC) notes that, unlike the human funeral industry, pet aftercare is much less regulated. Regulations for pet funerals vary widely by country and region and generally cover the following aspects:

- **Home Burial:** Requires a minimum burial depth and restrictions near water sources.
- **Pet Cemeteries:** Must follow licensing and maintenance standards.
- **Cremation:** Subject to environmental regulations; facilities need proper certification.
- **Transportation:** May require permits, especially across borders.

## 1.4 The Upward Movement

The personally developed concept of the **Upward Movement** explores humanity's intrinsic orientation towards the sky, heavens, or afterlife, as reflected in cultural and religious notions such as heaven, paradise, and resurrection. This belief in the soul or spirit ascending to a higher realm is widespread across many cultures and religions. When thinking about a loved one who has passed, people often envision their soul rising to a higher, spiritual plane above the earthly world. (Gill, 1994)

By examining these historical and spiritual orientations, this section explores how the space funeral industry can connect with deep-seated beliefs, offering a profound cosmic resting place. Evidence supporting this concept comes not only from traditional beliefs of the five major world religions but also from scientific studies. These studies confirm humanity's longstanding orientation toward the sky in experiences of loss and death.

### 1.4.1 In the Context of Religion

#### The Concept of Resurrection

According to the Oxford English Dictionary, the term 'resurrection' is derived from the Latin verb 'resurgere', meaning 'to rise again', inherently incorporating the spatial notions of up and down.

This concept is fundamental in Christianity, where the belief in Jesus Christ's resurrection is regarded as the cornerstone of the faith. This event is central to understanding the concept of the etheric body and its role in the human experience. Some spiritual traditions hold that the etheric body detaches from the physical body after death and ascends to "higher realms of existence" (Valverde, 2022, p.248). This idea is also present in Judaism (Elledge, 2017), Buddhism (Jerryson, 2017), and Hinduism (Rukmani, 2017).

### The Concepts of Heaven and Paradise

The concepts of heaven, paradise, and similar realms have been central to many religious and philosophical traditions around the world. These concepts often represent an ideal state of existence, a place or condition of ultimate peace, happiness, and fulfillment, typically associated with the afterlife that occurs outside of earthly boundaries. While they share common themes, denomination of these concepts might be different and have their own interpretations and characteristics. (Gill, 1994)

**Heaven:** In Christian theology, Heaven is the final destination for the souls of the righteous, depicted as a place of eternal peace, joy, and communion with God, free from suffering and death. It is sometimes viewed as a state of being in God's presence rather than a physical location. Christians believe that life on earth is temporary and prepares one for eternal life. Upon death, a person's soul is judged by God; believers who have maintained their faith enter Heaven, while unbelievers are condemned to Hell. (Gill, 1994)

Islam offers a very similar concept of the afterlife: Known as ‘Jannah’, Heaven is described as a garden of eternal bliss, with various levels of paradise reserved for those who have lived righteous lives. Each level offers increasing degrees of pleasure, comfort, and closeness to God. The Qur'an provides vivid descriptions of the physical and spiritual rewards awaiting the faithful in Jannah. (Ross, 2001; Greenberg, 2007)

Other than in Christianity or Islam, the concept of Heaven in Judaism is less defined. The term ‘Olam Ha-Ba’ (the World to Come) is often used to describe a future state of existence where the righteous enjoy closeness to God. Some interpretations suggest a physical resurrection and a renewed world, while others see it as a purely spiritual realm. (Elledge, 2017)

The idea of spiritual achievement rather than a physical location as a concept of Heaven, is also found in Buddhism and Hinduism. The Buddhist define their Heaven ‘Nirvana’: the highest state of peace through one’s enlightenment (Jerryson, 2017). In Hinduism, this state of being is called ‘Moksha’. It encompasses the liberation of the soul from the cycle of birth, death, and rebirth (samsara). (Filippi, 1996)

**Paradise:** The concept of Paradise happens to be used interchangeably with Heaven, especially in Christian (Gill, 1994) and Islamic theology (Greenberg, 2007), when referring to the Garden of Eden or the state of the righteous after death (Gill, 1994). According to The Concise Oxford Dictionary of the Christian Church (2013) the term 'paradise' probably originates from the ancient Persian word 'pairidaēza', meaning an enclosed garden or park. Over time, it has come to symbolize an idyllic, blissful physical place or spiritual state of contentment and peace throughout all major religions, as we have seen in the previous chapter.

### 1.4.2 Beyond Religious Traditions and Beliefs

Regardless of their various denominations and interpretations, the concepts of higher realms have shaped the hopes, ethics, and practices of countless people throughout history. They reflect humanity's deep-seated desire for meaning, justice, and ultimate happiness. (Gill, 1994) Even in the modern cinematographic sector, there are various examples of how humans refer to the sky when it comes to remembering and honoring the deceased (Hauser, 2009).

#### An Example of the Entertainment Industry

In Pixar's 2009 film 'Up', 78-year-old Carl Fredricksen, a retired balloon salesman, faces being forced out of the house he and his late wife Ellie built together. Instead of moving, Carl ties thousands of balloons to the roof, lifting his house into the air and heading to South America. This journey fulfills a promise he made to Ellie years earlier to visit Paradise Falls, the world's tallest waterfall in the South American rainforest. Over time, their dream had been set aside for everyday life, but with Ellie's passing, Carl finally embarks on the adventure. (Pixar, 2009)

It is not a coincidence that the creators of 'Up' have incorporated an adventurous trip through the skies to a place called 'Paradise Falls' when symbolically depicting the protagonist's struggle with processing his wife's death. (Wozny, 2014) In fact, Carl's physical journey represents his journey of grief and letting go, an 'Up'ward movement rather than down. (Hauser, 2009)

### Physiological Proof

Not only in a biblical, religious, or cultural way, even on a physiological level there is the tendency of an upward direction: a study by Marconi et al. (2023) suggests that when activating internal visualization, visual remembrance, or imagination, the study's participants were measured top eye movement.

The concept of the Upward Movement taps into humanity's deep-rooted orientation toward the sky, heaven, and higher spiritual realms. Across various cultures and religions, from Christianity to Hinduism, the idea of the soul or spirit ascending after death has been a central theme, symbolizing peace, fulfillment, and eternal life. Beyond religious beliefs, this upward direction resonates in cultural representations, such as in the film *Up*, and even in physiological studies. By connecting with these universal symbols, the space funeral industry can offer a meaningful resting place that aligns with humanity's long-standing visions of the afterlife.

# 2 THE COMPETITIVE SPHERE

In addition to understanding consumer needs, preferences, and trends, this market research also examines the competitive landscape of the traditional funeral business as well as companies operating memorial services in space. This layer analyzes existing and emerging players within the funeral industry and the space business more broadly, to assess market competition and identify potential collaborators or competitors. By evaluating the strategies, offerings, and market positioning of these companies, the research provides a strategic overview of the competitive environment, highlighting opportunities and challenges for new entrants into the space funeral market.

*Fig. 20: Overview of Potential Competitors (Company Logos)*

## 2.1 Market Insights on the Traditional Global Funeral Industry

As *The Economist* titled in 2018 **"Great news for the dead: the funeral industry is being disrupted"** the funeral industry has been undergoing significant transformation in recent years, driven by cultural shifts, environmental concerns, and technological advancements. This section provides insights into the global market size, growth trends, and shifting preferences between burial and cremation. Emerging trends, such as creative methods for handling ashes – including transforming them into keepsakes or sending them into space – highlight a growing desire for personalization and symbolic gestures. An exploration of the pet aftercare market reveals parallel trends, reflecting broader societal changes in how loss and remembrance are approached, underscoring the need for compassionate and innovative services.

### 2.1.1 Structure of the Traditional Funeral Industry

The funeral industry is traditionally categorized into three types: **Pre-Need**, **At-Need**, and **Post-Need** services. At-Need services are related to the immediate requirements following a death and have historically dominated the market. However, the Pre-Need market is expected to grow significantly, driven by increased awareness of the benefits of planning ahead, which allows individuals to take advantage of customized funeral arrangements based on their wishes, preferences, and needs (Report Linker, 2024). Similarly, Post-Need funeral services are also on the rise (Technavio, 2024).

Within these three categories, various services facilitate end-of-life care, memorials, and burial or cremation processes. As outlined by market leaders like the National Funeral Directors Association (NFDA) and The Funeral Service Foundation, Pre-Need, At-Need, and Post-Need businesses include a variety of service providers specializing in specific areas of funerals and aftercare. These services range from immediate support and funeral handling to pre-planning, counseling, and financing in advance of a passing, as well as remembrance services.

### Typical At-Need Services

**Funeral Homes:** So-called funeral homes are the central hubs where most end-of-life services are coordinated and are typically called into action in the aftermath of a death. They help plan the funeral, organize transportation of the body, and offer both traditional and custom services based on the family's preferences. The key services of funeral homes include: Embalming and body preparation, funeral planning and coordination, transportation of the deceased (hearse services), hosting visitations and services, obituary writing and announcements, and cremation services (often outsourced).

**Crematoriums:** Crematoriums are specialized facilities where the body is cremated, either as part of a funeral home or an independent entity. The key services of crematoriums include: Cremation of the deceased**,** management of ashes (urns, keepsakes, etc.), and memorial or scattering ceremonies for ashes.

**Cemeteries:** Cemeteries manage burial plots, crypts, and mausoleums for individuals or families. They are responsible for maintaining the grounds and ensuring proper burial practices. The key services of cemeteries include: Sale of burial plots or mausoleum spaces, perpetual care (maintaining grave sites), grave digging and burial services, and headstone installation and customization.

**Transportation Services:** Separate from funeral homes, some companies provide specialized transportation for the deceased, especially over long distances. The key services of specialized transportation companies include: Repatriation of remains (transportation across state or international borders) and hearse and limousine services for funeral processions.

**Grief Counseling & Support Services:** Some funeral homes offer in-house grief counseling, or they partner with external therapists and support groups to help families cope with loss. The key services of grief counseling include: Bereavement support groups, individual or family counseling, and online grief resources and forums.

### Typical Pre-Need Services

**Funeral Insurance Providers:** Pre-need insurance companies allow individuals to plan and pay for their funerals in advance, reducing the financial burden on their families later. The key services of funeral insurance providers include: Funeral pre-planning packages, and insurance coverage for burial and funeral expenses.

**Green Funerals and Eco-Friendly Services:** As demand for sustainable practices increases, businesses specializing in eco-friendly burials and cremation services have emerged. The key services of green funeral providers include: Biodegradable caskets, urns, and shrouds, natural or conservation burials (burial without embalming, often in preserved natural areas), and aquamation (water-based cremation).

### Typical Post-Need Services

**Event Planning and Memorial Services:** These can be specialized businesses or part of larger funeral homes that organize memorial services or unique celebrations of life. The key services of memorial providers include: Custom event planning for wakes, memorial services, or life celebrations, digital tributes, memorial videos, or photo displays, and remote/virtual memorial services (especially post-pandemic).

**Digital Memorial Services:** This relatively new sub-business is focused on creating online spaces where people can memorialize their loved ones. The key services of digital memorial providers include: Hosting online memorial pages, livestreaming funeral services, and collecting digital tributes or donations for charities in memory of the deceased.

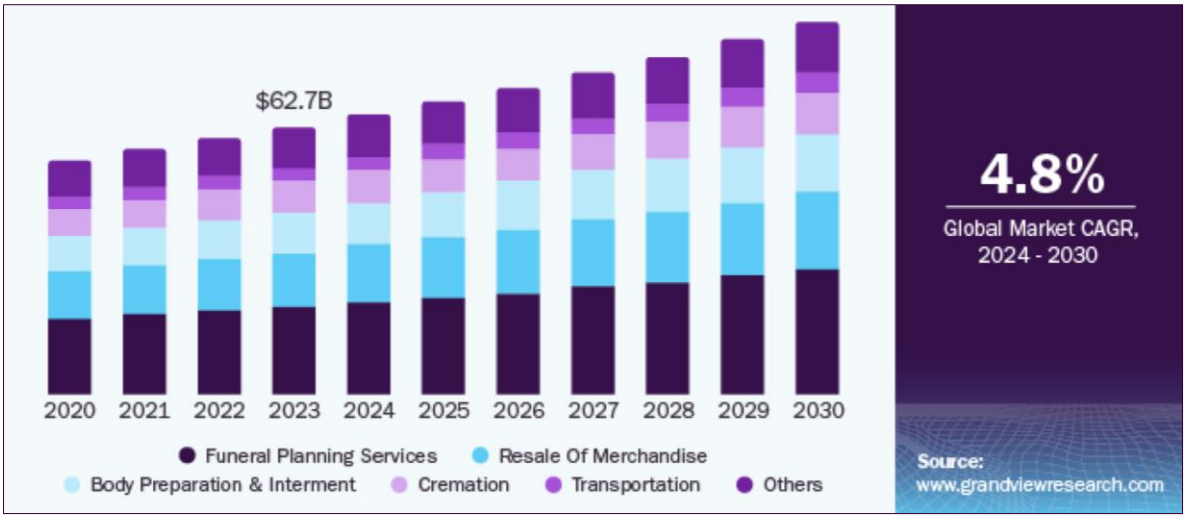
Moreover, headstone and monument manufacturers, florists, and casket manufacturers are crucial services of the funeral industry.

### 2.1.2 Overview on the Global Market Size and Growth

Numbers and figures on the global funeral industry vary significantly across market reports and business insights sources. However, one common finding in all research is that the funeral industry is experiencing consistent growth. According to a 2024 report by Grand View Research, the global funeral services and cremation market was valued at around USD 62.72 billion in 2023, and it is expected to grow to USD 87 billion by 2030, with a compound annual growth rate (CAGR) of approximately 4.82% over this period. In comparison, a 2024 Kings Research report estimates a CAGR of 8.14%, while research conducted by Technavio (2024) places the CAGR at 6.99%, falling somewhere in the middle.

The following graph highlights this upward trend based on funeral services.

*Fig. 21: Global Funeral and Cremation Services Market (Size, by Service, 2020 – 2030 in USD Billion)*




*Source: https://www.grandviewresearch.com/industry-analysis/funeral-cremation-services-market-report*

The market's growth is driven by the rising demand for funeral services, increasing cremation rates, and shifting consumer preferences toward personalized and eco-friendly options. These aspects are covered in chapter 1.3 of this section.

### Regional Market Insights

In the **United States** alone, the funeral industry is valued at approximately $20 billion, with over 2.5 million funerals conducted annually. Due to its affordability and lower environmental impact cremation is becoming the dominant method of disposition, accounting for around 56% of funerals, and is expected to reach 80% by 2030. The average funeral in the U.S. costs around $7,640, and funeral homes employ over 100,000 workers. (Worldmetrics, 2024).

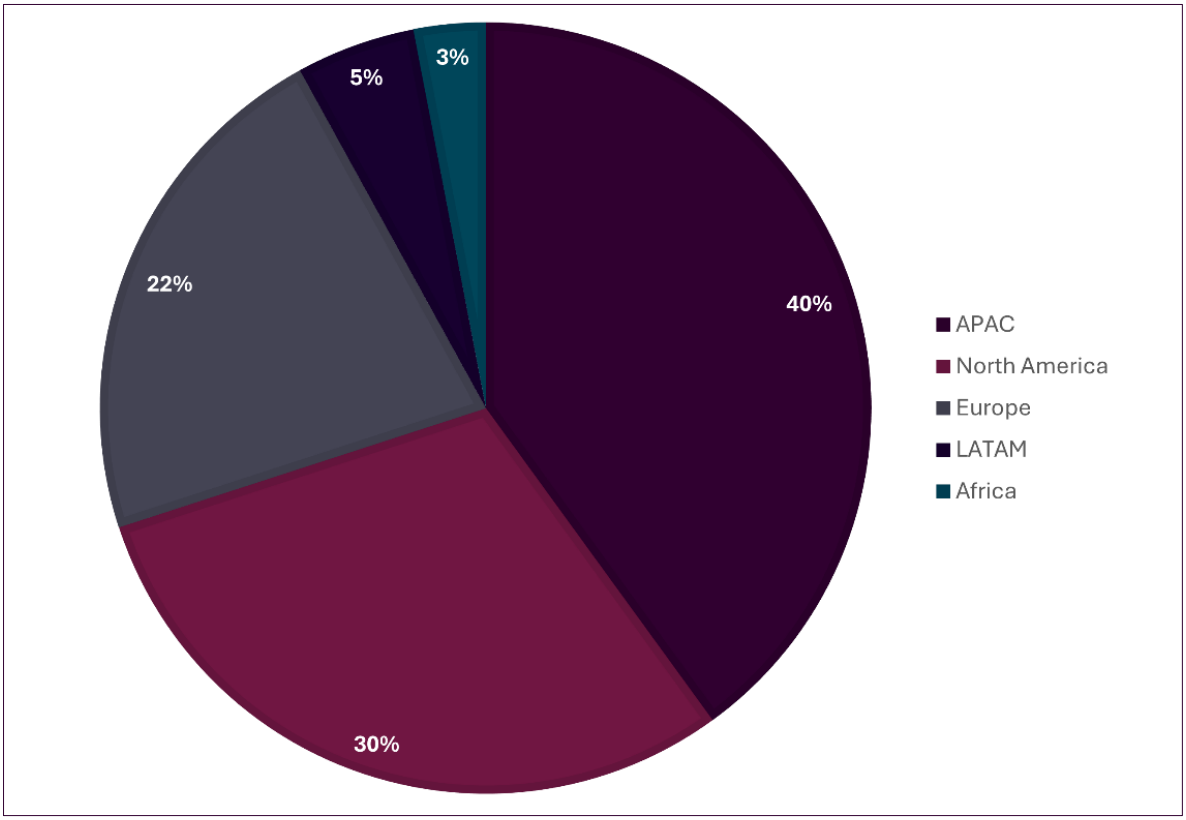
**Europe** is also experiencing growth, with an estimated market size of $17.3 billion according to a 2024 report by Kentley Insights. Particularly in countries like Germany, one of the largest European markets, cremation has become more and more popular. Germany recorded 930,000 deaths in 2022, and the aging population, particularly those over 65 years old, significantly drives the demand for funeral services. Followed by Germany we find UK, where the funeral and cremation services market is also expected to grow. In 2022, the UK saw around 669,762 cremations, supported by over 315 crematoriums. (Grand View Research, 2024)

The **Asia-Pacific** (APAC) funeral industry represented the largest global market share at 40.00% in 2023 expected to be the fastest growing region in the market (Grand View Research, 2024). This growth is driven by rising cremation trends, urbanization, and evolving lifestyles in the region, especially in countries like Japan and China. As middle-class populations expand and economic development increases, there is a growing demand for personalized and elaborate funeral services, reflecting cultural and personal values. (Kings Research, 2024; Technavio, 2024)

The **Latin-American** (LATAM) market is small but growing, with countries like Brazil and Mexico seeing an increase in demand for cremation and funeral services as cultural practices evolve, whereas the **African** market remains small due to lower economic development and traditional burial practices. However, urbanization is slowly leading to shifts in funeral practices.

The following graph gives a snapshot of how funeral services are distributed globally, with APAC, North America, and Europe leading the market. (Graph based on Kentley Insights 2024 Report):

*Fig. 22: Market Share of the Traditional Funeral Industry by Region, 2023*




*Source: https://www.kentleyinsights.com/Funeral-Homes-Funeral-Services-market-size/*

### 2.1.3 Global Competitors of the Traditional Funeral Industry

As highlighted in chapter 2, the funeral industry is steadily growing, driven by evolving consumer preferences and technological advancements. This section offers a brief overview of the end-of-life and afterlife sectors, covering traditional funeral services.

The global funeral industry is dominated by a few major players, particularly in North America, Australia, and parts of Europe, who have leveraged consolidation and strategic growth to lead the sector. The global players according to Grand View Research are as follows (2024):

**Service Corporation International (SCI)**, headquartered in Houston, Texas, is the largest provider of deathcare products and services in North America. With revenues exceeding $4 billion, SCI operates over 1,400 funeral homes and nearly 500 cemeteries across the U.S., Canada, and Puerto Rico. SCI's dominant position is supported by its vast network and comprehensive range

of services, from traditional funerals to cremations, under its Dignity Memorial brand. This scale provides SCI with significant economies of scale, helping it cater to over 600,000 families each year. (SCI News, 2024)

In the Asia-Pacific region, **InvoCare Limited** plays a similarly dominant role. Based in Australia, InvoCare operates across Australia, New Zealand, and Singapore, generating over $500 million in revenue. The company's focus on pre-paid funeral services and cremation options has driven its growth, making it a leader in its markets. Brands such as White Lady Funerals and Simplicity Funerals allow InvoCare to cater to a broad spectrum of customers. (Funeral Director Daily, 2023; IBIS World, 2024)

**Carriage Services Inc.** and **Park Lawn Corporation**, both based in North America, also hold notable positions. Carriage Services, with revenues approaching $400 million, has expanded through acquiring smaller, family-owned funeral homes. Similarly, Park Lawn Corporation, based in Canada, has grown rapidly by acquiring funeral homes and cemeteries across North America. Both companies are examples of how acquisition strategies are reshaping the North American funeral industry. (Carriage Services, 2023; Park Lawn Corporation, 2023)

In Europe, **Dignity plc**, headquartered in the United Kingdom, is one of the largest providers of funeral services, generating around £275 million in annual revenue. Dignity operates over 800 funeral locations across the UK, offering a broad range of services, including traditional burials, cremations, and pre-paid funeral plans. As in North America, consolidation has driven Dignity's growth, although the company also faces rising competition from more affordable funeral options. (NewsnReleases, 2023)

Meanwhile, in Central Europe, **Bestattungsinstitut Denk AG** with headquarter in Munich, Germany, has established itself as a key player in Germany, Austria, and Switzerland. While smaller than global counterparts like SCI and InvoCare, Denk has become a regional leader by offering comprehensive funeral services and capitalizing on changing cultural preferences towards cremation and eco-friendly burials. (Trauerhilfe Denk, 2024)

## 2.2 The Space Funeral Segment

### 2.2.1 Overview on the Global Market Size and Growth

Funeral services in space represent a relatively new and niche market, with only a few companies worldwide currently offering such services within the broader space industry. In fact, based on available research, no company specifically rooted in the traditional funeral industry offers this type of service. However, according to a study by Spherical Insights as of July 2024, the **space burial service market is projected to grow** at a CAGR of **6.8%** until 2033.

Companies in this sector provide services that involve launching a portion of cremated ashes into space – whether into Earth's orbit, deep space, or onto the lunar surface. Fueled by advances in space technology and a rising interest in unique commemorative options, the market is gaining traction among space enthusiasts and individuals seeking unconventional tributes. Key players collaborate with commercial space enterprises to ensure reliable and cost-effective launches. As public fascination with space exploration continues to grow, the space burial market is expected to expand, driven by its emotional appeal and the allure of space as the ultimate frontier. (Spherical Insights, 2024)

### 2.2.2 The Key Players in the Space Funeral Segment

As previously stated, there are only a few companies worldwide that offer space funeral services. Most of the competitors in this sector reside in the U.S. However, also in Europe and APAC, market players can be found. They are as follows:

### US-based competitors

- Celestis (https://www.celestis.com/)
- Elysium Space (https://elysiumspace.com/)
- Beyond Burials (https://beyondburials.com/)
- Elaníf (https://www.elanif.com/)

### Other competitors

- Aura Flights (UK) (https://www.ashesinspace.co.uk/)
- Space NTK (Japan) (https://space-ntk.com/)
- StardustMe (New Zealand) (https://www.stardustme.com/)

The following table gives a comparative overview of the key players in the space funeral sector.

*Fig. 23: Comparison of the Four US-Based Key Players of the Space Funeral Business (please rotate)*

| COMPANY | LOCATIONS | YEAR FOUNDED | FOUNDERS | ESTIMATED ANNUAL REVENUE | SERVICES OFFERED | PRICE RANGE OF SERVICES | BUSINESS PARTNERS | CUSTOMER EXPERIENCE | USP | SWOT ANALYSIS | | | | SOURCES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS | |
| Celestis | **HQ:** Houston, Texas, USA<br>Launch sites depending on availability:<br>▪ Cape Canaveral Space Force Station, Florida<br>▪ Spaceport America, New Mexico<br>▪ Vandenberg Space Force Base, California | 1994 | ▪ Charles Chafer<br>▪ Stephen Eisele | **$2-5 million** | ▪ Small portion of remains sealed in individual flight capsule<br>▪ ***Earth Rise Service:*** Suborbital flight. Launch and return of flight capsule<br>▪ ***Earth Orbit Service:*** Orbital flight until natural burn up<br>▪ ***Luna Service:*** Capsule placed on lunar surface<br>▪ ***Voyager Service:*** Capsules sent into deep space | Starting at **$3.495 - $12.995** depending on service chosen | ▪ NASA<br>▪ SpaceX<br>▪ Blue Origin<br>▪ United Launch Alliance (ULA) | ▪ Families attend events and memorial ceremonies pre and at launch day<br>▪ Tracking service<br>▪ Video recording of launches provided<br>▪ Memorial keepsakes (flight certificate, patch) | Global pioneer in space memorials, partnered with NASA | ▪ Pioneer in space burial services<br>▪ Well-established reputation<br>▪ 30 years of experience<br>▪ Major partnerships<br>▪ Long track record of celebrity clients, e.g. Gene Roddenberry (creator of Star Trek) | ▪ High costs associated with full space missions<br>▪ Services highly dependent on launch schedules<br>▪ Very few launches available per year<br>▪ High environmtl. impact | ▪ Expansion into deep space missions incl. Mars and eventually other planets<br>▪ Growing demand for space funerals and space exploration | ▪ Dependence on external space launch providers<br>▪ Competition from more affordable, customizable high-altitude alternatives | Company Homepage |
| Elysium Space | **HQ:** San Francisco, California, USA<br>Launch sites depending on availability:<br>▪ Cape Canaveral Space Force Station, Florida<br>▪ Pacific Missile Range Facility, Kauai, Hawaii<br>▪ Vandenberg Space Force Base, California | 2013 | Thomas Civet | **$1-3 million** | ▪ Small portion of remains sealed in individual flight capsule<br>▪ ***Shooting Star Memorial:*** Orbital flight until natural burn up<br>▪ ***Lunar Memorial:*** Capsule placed on lunar surface<br>▪ ***Milky Way Memorial:*** Capsules sent into deep space | Starting at **$9.950 - $11.950** depending on booking time | ▪ SpaceX<br>▪ Orbital ATK<br>▪ Rocket Lab | ▪ Families attend events and memorial ceremonies pre and at launch day<br>▪ Live webcast available<br>▪ Mobile app for real-time tracking of remains in orbit<br>▪ Commemorative flight certificate and photos | High-end tracking service of satellites via APP | ▪ More affordable services<br>▪ Integration of tracking technology via APP<br>▪ 10+ years of experience | ▪ Same as Celestis plus:<br>▪ Limited number of completed missions<br>▪ Less experience than Celestis | Same as Celestis | ▪ Same as Celestis plus:<br>▪ Competition from more experienced companies offering the same services | Company Homepage |
| Beyond Burials | **HQ:** Salt Lake City, Utah, USA<br>Launch sites depending on availability:<br>▪ Cape Canaveral Space Force Station, Florida<br>▪ Vandenberg Space Force Base, California | 2020 | Dan Peabody | Less than **$1 million** | ▪ Small portion of remains sealed in individual flight capsule<br>▪ ***Starlight Memorial:*** Suborbital flight. Launch and return of flight capsule<br>▪ ***Shooting Star Memorial:*** Orbital flight until natural burn up<br>▪ ***Moon Memorial:*** Capsule placed on lunar surface<br>▪ ***Milky Way Memorial:*** Capsules sent into deep space | Starting at **$1.500 - $12.500** depending on service chosen | ▪ SpaceX<br>▪ Virgin Orbit<br>▪ Sierra Nevada Corp. | Video recording of launches provided | Unclear | ▪ Highly competitive prices<br>▪ Very easy handling process of sending portion of ashes | ▪ Less brand visibility compared to Celestis or Elysium<br>▪ No significant individualizati on available<br>▪ Very little experience | Same as Celestis | ▪ Growing interest in space memorial services<br>▪ Chance to adjust value proposition to contrast competitors | ▪ Same as Celestis plus:<br>▪ Competition from more experienced companies offering the same services | Company Homepage |
| Elanif | **HQ:** precise location not found, somewhere in the U.S.<br>Launch sites not found | Not found | Not found | Less than **$1 million** | ▪ Place ashes into unique "wow" locations, including space and other spectacular uncommon places<br>▪ More details on space burials not found | Not found | Not found | Details not found | Specialist in organizing ash placements in unique locations | Apparently very early stage, potential for innovative service offerings | Lack of visibility and established reputation | Same as Beyond Burials | Same as Beyond Burials | Company Homepage<br>Datanyze |

*Fig. 24: Comparison of the Non-US-Based Key Players of the Space Funeral Business (please rotate)*

| COMPANY | LOCATIONS | YEAR FOUNDED | FOUNDERS | ESTIMATED ANNUAL REVENUE | SERVICES OFFERED | PRICE RANGE OF SERVICES | BUSINESS PARTNERS | CUSTOMER EXPERIENCE | USP | SWOT ANALYSIS | | | | SOURCES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS | |
| Aura Flights | **HQ:** Sheffield, UK<br>Permanent launch site: Sheffield, UK | 2015 | Matthew Giddings | Less than **£1 million** | High-altitude balloon launches | Starting at **£3950** | None officially known | ▪ Video footage of ashes being released<br>▪ Personal flight certificate | ▪ First company in Europe to offer space memorials<br>▪ First company worldwide to use in-house technology for space memorials | ▪ Affordable / low-cost<br>▪ Eco-friendly<br>▪ Ash scattering available<br>▪ Independent from third-party flight schedules | ▪ Limited reach (only near-space)<br>▪ No live tracking available<br>▪ Geographically in Europe, but located on the island of UK | ▪ Growing interest in space memorial services<br>▪ Rising interest in affordable and sustainable funerals | Competition from companies offering true space travel | Company Homepage |
| Space NTK | **HQ:** Tsukuba, Japan | 2017 | Tomoko Kasai | Less than **$1 million** | ▪ Earth Orbit Memorials<br>▪ Space Scatter: Travel<br>▪ Space Pre-funeral Services | Starting at **¥300,000 (app. $2,700)** depending on service chosen | SpaceX | ▪ Customers can track the memorial satellite in orbit<br>▪ Offers both space burials and symbolic pre-funeral services | ▪ Japan's first space burial company<br>▪ Offers pre-funeral options<br>▪ Uses own satellites | ▪ Strong regional presence<br>▪ Pre-funeral options (sending body parts like nails, hair to space) | Still emerging in the global space memorial market | Same as Celestis | ▪ Same as Celestis plus:<br>▪ Competition from more experienced companies offering the same services | Company Homepage |
| StardustME | **HQ:** Gisborne, New Zealand | 2023 | Stu Potter | Less than **$1 million** | ▪ Memorial Spaceflight<br>▪ Customizable Memorial Tokens | Starting at **$1,995** depending on service chosen | ▪ SpaceX<br>▪ D-Orbit | ▪ Real-time satellite tracking<br>▪ Personalized memorial tokens<br>▪ Commemorative keepsake token for families | Uses proprietary "memorial tokens" that orbit for up to 5 years | Same as Elysium Space | Still new in the market, fewer completed missions than competitors | Same as Celestis | ▪ Same as Celestis plus:<br>▪ Competition from more experienced companies offering the same services | Company Homepage |

### 2.2.3 Deep-Dive into the Modus Operandi of Each Space Funeral Competitor

**Celestis** arranges space burials by sending a portion of cremated remains or DNA samples into space using sealed flight capsules, which are integrated into a larger payload launched with commercial or scientific missions. These capsules contain a small part of the ashes, allowing multiple individuals to be part of a single launch. Families can choose destinations such as Earth orbit, the lunar surface, or deep space. The single procedural phases include:

- **Capsule Preparation:** After a family selects a service, a portion of the cremated remains or DNA is sent to Celestis, which stores it securely until the scheduled flight. A small portion is transferred to the flight capsule, which is engraved and prepared for launch.

- **Launch:** The capsules are integrated into a satellite or other spacecraft and launched into space. Depending on the selected service, the remains can either remain in orbit, land on the Moon, or travel into deep space.

- **Flight Options:** For the suborbital flights included in the **'Earth Rise Service'**, the capsules return to Earth after the flight, and the family receives the flown capsule as a keepsake. **'Earth Orbit Service'** offers a launch of the capsule aboard a commercial or scientific satellite into Earth orbit, where it will remain for a period ranging from months to years, depending on the satellite's mission. The capsule eventually re-enters Earth's atmosphere, creating a moment of tribute as it is incinerated like a 'shooting star'. With the **'Luna Service'** the remains are carried aboard a lunar lander, like Astrobotic's Peregrine Mission One, and land on the Moon. The capsules remain on the Moon, becoming a lasting tribute to Earth's nearest celestial body. The **'Voyager Service'** sends remains on a mission beyond the Earth-Moon system. In deep space capsules journey forever in space.

- **Memorial Events:** Celestis organizes pre-launch events for the families, including tours, memorial services, and a gathering at the launch site. If families cannot attend in person, a webcast of the event is available.

- **No Ash Scattering:** The ashes are not spread in space but remain sealed within the capsules, ensuring that no debris is left in space.

**Elysium Space** basically has the same business model and procedure pattern as Celestis. It offers memorial spaceflights that send a symbolic portion of cremated remains or DNA samples into space. The company provides a variety of celestial memorial services tailored to different space journeys, such as Earth orbit, lunar landings, and deep space exploration. Each service uses specialized capsules, which are launched alongside commercial or scientific payloads. These capsules are designed to carry only a small portion of the individual's remains, allowing multiple participants in a single launch.

- **Capsule Preparation:** After a family selects a service, a portion of the cremated remains or DNA is sent to Celestis, which stores it securely until the scheduled flight. A small portion is transferred to the flight capsule, which is engraved and prepared for launch.

- **Launch:** Elysium partners with leading space companies like SpaceX, ULA, and Astrobotic for its launches. Depending on the service chosen, the capsules are sent into Earth orbit, to the Moon, or deep space. The capsules are attached to a spacecraft, and families are invited to participate in pre-launch events. If they cannot attend, Elysium offers a live webcast to allow families to witness the launch remotely.

- **Flight Options:** The **'Shooting Star Memorial'** service places the ashes into Earth orbit, where they circle the planet for a period ranging from months to years. Eventually, the capsule re-enters the atmosphere and vaporizes, creating a 'shooting star' effect. This symbolic ending allows families to feel connected to their loved ones each time they look at the night sky. The **'Lunar Memorial'** services are made for families seeking a more permanent celestial resting place, sending ashes to the surface of the Moon. This is a highly symbolic service, with capsules being delivered by a lunar lander. Elysium partners with companies like Astrobotic for lunar missions, offering families a lasting connection to Earth's closest celestial body. For those desiring an eternal journey, the **'Milky Way Memorial'** sends the capsules beyond the Earth-Moon system into deep space. The remains will travel indefinitely, symbolizing a perpetual voyage through the universe.

- **Memorial Events:** Elysium Space provides families with a range of pre-launch experiences, similar to those offered by Celestis. These include tours of the launch site, a memorial service, and a gathering on launch day. For families unable to attend in person, the launch is

broadcast via a live webcast. Families can follow the capsule's journey post-launch using satellite tracking systems.

- **No Ash Scattering:** Like Celestis, Elysium Space ensures that ashes are not scattered in space. The remains are securely sealed within flight capsules that remain intact throughout their journey.

**Beyond Burials** applies the same business model as Celestis and Elysium Space: The company offers space memorial services by sending a symbolic portion of cremated remains into space. In this case like in the previously analyzed cases, the procedure is as follows:

- **Capsule Preparation:** Once a family selects one of four available service options, a symbolic portion of the cremated remains is sent to Beyond Burials, where it is carefully stored until the scheduled launch. The remains are placed in a sealed, engraved capsule, prepared for space travel.

- **Launch:** The capsules are integrated into a satellite or spacecraft and launched into space according to the selected memorial option. Depending on the service, the remains can orbit the Earth, land on the Moon, or travel into deep space, with the intention of leaving no lasting impact or debris.

- **Flight Options:** The **'Starlight Memorial'** offers a suborbital flight where the capsule briefly enters space before returning to Earth, allowing the family to keep the flown capsule. The **'Shooting Star Memorial'** sends the capsule into low Earth orbit, where it remains for a period before re-entering the atmosphere and burning up like a 'shooting star'. The **'Moon Memorial'** places the capsule on the lunar surface, while the **'Milky Way Memorial'** sends it on an indefinite journey into deep space.

- **Memorial Events:** Unlike its competitors Celestis and Elysium Space, Beyond Burials does not seem to arrange pre-launch memorial services for families. The only commemorative tool consists of a recorded, professionally edited video of the entire process.

- **No Ash Scattering:** The ashes are not scattered in space. They remain sealed in their capsules.

**Space NTK** is a space funeral company based in Tsukuba, Japan, offering services for both human and pet cremated remains. The company differentiates itself by providing unique services, including space 'pre-funerals', where non-cremated remains like hair or nails are launched into space. Space NTK uses SpaceX rockets for its space burials, and their satellites, such as '**Magokoro'**, are placed in low Earth orbit, where they remain for several years before burning up upon re-entry, creating a 'shooting star' tribute. The remains are kept in specially designed capsules that orbit Earth for around 5-6 years before re-entering the atmosphere.

- **Capsule Preparation:** After families select a service, they send a portion of the remains or other symbolic items like hair. The remains are placed in a container and mounted on a satellite for launch.
- **Launch:** The capsules are attached to the upper stages of a SpaceX rocket. The satellites orbit Earth for several years before re-entering and disintegrating as they return to Earth.
- **Flight Options:** Space NTK offers orbital space burials that send ashes into Earth's orbit. There is also an option for **pre-funeral flights**, allowing people to send non-cremated remains like hair or nails into space before their death. The service is available for both humans and pets.
- **Memorial Events:** Families can watch live streams of the launch, and there are options for photo albums and other commemorative items. Space NTK also offers an in-person tour to witness the launch at an additional cost.
- **No Ash Scattering:** The ashes remain sealed within the satellite, and no scattering takes place in space. The capsule burns upon re-entry, creating a symbolic 'shooting star'.

**StardustME** offers affordable space memorial services by launching a symbolic portion of ashes into orbit. The company works with SpaceX rockets, sending cremated remains into low

Earth orbit. The capsule, which contains the ashes, orbits Earth for 5-10 years before re-entering the atmosphere, where it burns up, creating a 'shooting star' effect. StardustME provides a personal tracking service so families can monitor when the satellite passes overhead.

- **Capsule Preparation:** A small portion of the ashes is placed into a specially designed capsule or token that is launched aboard a SpaceX Falcon 9 rocket. Each capsule is personalized with engravings and other customizations.
- **Launch:** The capsule is launched into low Earth orbit onboard a SpaceX Falcon 9 rocket. After the launch, the ashes orbit Earth for several years.
- **Flight Options:** StardustME specializes in orbital flights, where ashes remain in Earth's orbit for several years before re-entry. The entire flight is trackable, allowing families to follow the capsule's location in real-time.
- **Memorial Events:** Families receive a keepsake token and a personalized tracking service. The service also includes a custom memorial video, and families can watch the capsule's orbit in real-time.
- **No Ash Scattering:** The ashes remain sealed in the capsule until they burn up upon re-entry, providing a visually symbolic return to Earth without leaving space debris.

**Aura Flights** offers space memorial services by scattering a loved one's ashes at the edge of space. Using stratospheric balloons, they send the remains to approximately 100,000 feet (32,500 meters) above the Earth. There, the ashes are released and spread around the globe over the course of 3-6 months before naturally returning to the Earth as part of rainfall or snowflakes. Aura Flights ensures an eco-conscious process with the use of hydrogen lift gas and biodegradable balloons. Unlike the previously analyzed companies, the space memorial procedure established by Aura Flights looks as follows:

- **Preparation:** Once a family books a flight, Aura Flights collects the ashes through either a personal handover or a dedicated courier service. The ashes are placed in a scattering vessel specifically designed for this purpose, which will later be released into the upper atmosphere.
- **Launch:** The ashes are carried into the stratosphere by a hydrogen-filled balloon, where they are gently scattered over the Earth. The launch and release are captured by 4K cameras, and the footage is incorporated into a personalized memorial video.
- **Flight Options:** Unlike other providers that offer deep space or lunar memorials, Aura Flights focuses on a single service: scattering ashes in the stratosphere. The scattering occurs at an altitude that allows the ashes to naturally circulate in the Earth's atmosphere before settling back down over several months.
- **Memorial Events:** After the flight, Aura Flights creates a customized memorial video documenting the entire journey. The video includes images, messages, and footage of the release, allowing families to share a unique and lasting tribute to their loved one.
- **Ash Scattering in Space:** Unlike other services that involve remains staying in space or landing on celestial bodies, Aura Flights ensures that the ashes return to Earth naturally, making the process both symbolic and environmentally responsible.

**Please note:** As there is very little information available online about the services offered by Elaníf, this company is not further considered in this overview.

The competitive landscape of the space funeral industry is marked by a blend of traditional end-of-life services and emerging space memorial offerings. As major global players dominate the traditional funeral market through consolidation and innovation, space funeral services present a niche, but growing segment driven by advancements in space technology and shifting consumer preferences for unique, symbolic tributes. Extensive research indicates that only a few companies worldwide currently offer space burials, leaving the market relatively open for new entrants. However, the steady growth and revenues of companies like Celestis, Elysium Space, Beyond Burials, Space NTK, and StardustME demonstrate increasing interest in space memorial services, with most offering similar orbital or deep space options. Aura Flights, with its unique approach of scattering ashes in the stratosphere, stands out from the competition. These companies are based in highly technological or Westernized countries, reflecting a customer base primarily from these regions. Nonetheless, there is potential for expansion into Europe, Asia-Pacific, and Africa, given rapid developments in the space industry and evolving funeral practices.

## Close-Up: Funeral vs. Memorial Service

A memorial service is a ceremony that honors and remembers a person who has died, but typically without the body of the deceased present. It usually takes place sometime after the death, allowing friends and family more flexibility in planning. A funeral service, on the other hand, is a more immediate ceremony where the body of the deceased is usually present, often held within a few days of death.

The following table gives a brief overview over the key differences:

*Fig. 25: Key Differences Between Funeral and Memorial Services Summarized*

| Aspect | Funeral Service | Memorial Service |
|---|---|---|
| **Body Present** | Yes (either open or closed casket) | No (though an urn may be present) |
| **Timing** | Within days of death | Can be scheduled any time after death |
| **Tone** | Formal, often somber, with mourning | Flexible, often celebratory |
| **Venue** | Funeral home, church, cemetery | Anywhere meaningful |
| **Purpose** | Saying farewell to the body | Remembering and celebrating the life |

Both memorial and funeral services can be either religious or secular, depending on the family's beliefs. Funerals traditionally include more religious elements, especially those tied to burial rites, while memorial services may include religious elements or be entirely secular, depending on the family's wishes.

A memorial service offers more creative freedom and time for families to focus on honoring the memory of their loved one, while a funeral service is typically part of the immediate response to death, centered around the farewell to the deceased's body.

(Rumbold et al., 2021)

## 2.3 Market Insights on the Space Industry

As discussed in chapter 2.2 of this section, most companies providing space memorial services rely on **launch service providers** and **satellite manufacturers** to carry out their missions. These companies use launch providers to transport commemorative payloads into space, while some opt for **high-altitude balloons** as a more accessible solution for near-space journeys. These balloons offer a symbolic ascent to the edge of space, providing a cost-effective alternative to traditional space launches.

This chapter examines the broader space industry, focusing on key sectors such as launch service providers and satellite manufacturers (defined as 'core' players) as well as high-altitude balloon operators. While governmental agencies remain essential for space activities and might be mentioned hereafter, the focus in this chapter is on commercial enterprises and private-sector innovations shaping the future of space access.

Special attention is given to **start-ups** that are driving innovation, particularly those addressing sustainability by developing reusable launch vehicles and minimizing environmental impact. Additionally, new companies offering affordable access to space are transforming the industry by expanding space exploration and services to a wider market.

This chapter offers an overview of the space industry in general and delivers detailed analysis of the major players and technological advancements shaping today's space industry, emphasizing sustainability and commercialization.

### 2.3.1 Overall Space Market Size and Growth

Before delving into the companies shaping the current New Space Economy landscape, this section provides an overview of the space market's key facts and figures, establishing the framework for the subsequent competitive analysis.

Following the most recent evaluation made by the World Economic Forum, the global space industry is on an accelerated growth trajectory, driven by technological advancements, increased private sector participation, and rising demand for satellite services and space exploration.

**“The $1.8 Trillion Opportunity”** (2024, title) says it all: With an estimated growth rate of 9% per year – twice the expected GDP growth – the $1.8 trillion are projected to be reached by 2035.

Commercial space ventures account for the majority of this growth, contributing **78%** of the total market value, or **$445 billion**, according to the Q2/2024 Space Report by The Space Foundation. Key areas of growth include satellite communications, positioning, navigation, and timing services. Furthermore, the global space launch and satellite manufacturing sectors experienced significant increases, driven by the growing pace of satellite deployment, especially in low Earth orbit (LEO).

This positive trajectory underscores the industry's critical role in shaping future technologies and global infrastructure, and – why not – future funeral and memorial services applications.

### 2.3.2 Established Players of the Core Space Industry

#### Launch Service Providers

Launch Service Providers focus on developing and operating rockets to launch payloads, including satellites, cargo, crew, and ash capsules, into space. According to The Space Report Q2/2024 by the Space Foundation, some of the most prominent participants in the private space sector include:

**SpaceX** (USA) as the leader in reusable launch vehicle technology with its **Falcon 9** and **Falcon Heavy** rockets, both designed for reusability. The **Starship** program, currently in development, aims to be a fully reusable system for missions to the Moon, Mars, and beyond. (spacex.com)

**Blue Origin** (USA) focuses on reusability through its **New Shepard** suborbital vehicle, designed primarily for space tourism and research. The company is also developing the **New Glenn** rocket, a partially reusable heavy-lift launcher. Blue Origin has ambitious long-term plans for space exploration, including its **Orbital Reef** space station and the **Blue Moon** lunar lander. (blueorigin.com)

**Rocket Lab** (New Zealand/USA) specializes in small satellite launch services with its **Electron** rocket. The company is also working on **Neutron**, a medium-lift reusable rocket, to expand its capabilities and serve larger payload markets. (rocketlabusa.com)

**United Launch Alliance (ULA)** (USA), a joint venture between Boeing and Lockheed Martin, operates the **Atlas V** and **Delta IV** rockets. ULA's upcoming **Vulcan Centaur** rocket is designed for partial reusability, using recoverable engines. ULA focuses heavily on national security launches and deep-space exploration missions. (ulalaunch.com)

**Arianespace** (Europe) operates the **Ariane** series of rockets, with the upcoming **Ariane 6** aimed at being more cost-competitive, although not reusable. Additionally, the European Space Agency (ESA) is exploring reusable technologies through projects like **Prometheus**. (arianespace.com)

### Satellite Manufacturers and Operators

Satellite Manufacturers and Operators are responsible for building and operating satellites used in various applications such as communications, Earth observation, navigation, and scientific missions. Additionally, some space memorial service companies utilize satellites to place containers with remains in orbit, providing a unique and lasting tribute. The most important satellite manufacturers and operators include:

**Maxar Technologies** (USA) specializes in Earth observation satellites, offering high-resolution imaging services for both commercial and government clients. Their satellites provide valuable data for sectors such as agriculture, mapping, and defense.

**Airbus Defence and Space** (Europe) manufactures satellites for a variety of purposes, including communications, Earth observation, and defense. Airbus is also involved in the **OneWeb** satellite constellation, which aims to deliver global broadband coverage.

**Thales Alenia Space** (Europe) is a major player in satellite construction, collaborating with governments and private companies to develop satellites for communications, scientific research, and Earth observation.

**Northrop Grumman** (USA) builds satellites for both government and commercial clients, focusing on communication and defense systems. The company is also a leader in satellite servicing technologies, particularly through its **Mission Extension Vehicle (MEV)**, which is designed to extend the operational life of aging satellites.

**OneWeb** (UK/Global) is focused on creating a satellite constellation to provide global broadband internet. The company is one of the key competitors to SpaceX's Starlink in the race to offer worldwide internet coverage.

**Planet Labs** (USA) specializes in small Earth-imaging satellites, operating a large constellation of **Dove** and **SkySat** satellites. These systems offer high-frequency, real-time imagery, serving industries such as agriculture, environmental monitoring, and disaster response.

**Inmarsat** (UK) is a leading provider of satellite communications, with a particular focus on the maritime, aviation, and defense sectors. The company's satellite network enables global connectivity in remote and challenging environments.

### 2.3.3 The Industry Landscape of Space Startups

The space industry is rapidly evolving, with numerous startups pushing the boundaries of what is possible through innovative and disruptive technologies. These startups focus on a wide range of areas, from next-generation launch systems and space infrastructure to satellite networks, in-orbit services, and space sustainability. Below is an overview of key space startups developing disruptive technologies across different sectors.

#### Launch Providers

Several startups are working on innovative, cost-effective, and disruptive launch systems, particularly for small satellites and reusable rockets. These companies are revolutionizing access to space by reducing costs and improving efficiency. The following table provides an overview of notable startups in the launch sector:

*Fig. 26: Overview of Startups in the Launch Sector*

| COMPANY | LOCATION | DISRUPTION | TECHNOLOGY | MISSION | SOURCES |
|---|---|---|---|---|---|
| Relativity Space | **HQ:** Long Beach, California, USA | 3D-printed rockets | Developing the **Terran 1**, the first 3D-printed rocket, and **Terran R**, a fully reusable rocket designed for frequent, low-cost space access | Relativity's use of automation and 3D printing could significantly reduce manufacturing times and costs in the space industry | Company Homepage |
| Astra | **HQ:** Alameda, California, USA | Ultra-low-cost launch services | Focuses on developing small, efficient rockets for frequent launches of small satellites into low Earth orbit (LEO) | Make access to space as routine as airplane travel, particularly for commercial and defense applications | Company Homepage |
| Isar Aerospace | **HQ:** Munich, Germany | European-based small satellite launch | Working on the **Spectrum** rocket, a cost-effective small launcher designed to meet the growing demand for satellite deployment | Isar aims to disrupt the market by providing a European solution for small satellite launches, competing with American companies like Rocket Lab and Astra | Company Homepage |
| Skyrora | **HQ:** Edinburgh, Scotland, UK | Eco-friendly launch systems | Developing a range of rockets (including the **Skyrora XL**) using proprietary **Ecosene** fuel, which is made from recycled plastic waste | This innovation aims to reduce the environmental impact of space launches | Company Homepage |

## In-Orbit Services and Space Sustainability

Startups in this category are tackling critical challenges such as space debris removal, satellite servicing, and orbital sustainability. Their technologies are essential for maintaining and extending the operational life of satellites while addressing the growing issue of space debris. The following table highlights the most important startups in this segment:

*Fig. 27: Overview of Startups in the Servicing Sector*

| COMPANY | LOCATION | DISRUPTION | TECHNOLOGY | MISSION | SOURCES |
|---|---|---|---|---|---|
| Astroscale | **HQ:** Tokyo, Japan | Space debris removal and in-orbit servicing | Developing solutions to clean up space debris and extend the operational life of satellites through its **ELSA-d** (End-of-Life Services by Astroscale-demonstrator) program | Astroscale is pioneering a new industry of space sustainability, aiming to ensure that Earth's orbits remain usable for future generations | Company Homepage |
| D-Orbit | **HQ:** Fino Mornasco, Italy | In-orbit logistics | Offers satellite deployment services via the **ION Satellite Carrier**, a space tug that can deploy multiple satellites in precise orbits | This in-orbit 'last-mile delivery' service simplifies and optimizes satellite placement, reducing costs for satellite operators | Company Homepage |
| Momentus | **HQ:** San Jose, California, USA | Space tug services | Provides in-space transportation services with water-powered propulsion systems. Its **Vigoride** vehicle is designed to move satellites between orbits, enabling multi-satellite deployment missions and satellite repositioning | This reduces the need for satellites to carry large propulsion systems, saving weight and cost | Company Homepage |

## Space Infrastructure

These startups are building the infrastructure necessary for humanity to expand its presence in space. Their projects include space habitats, space stations, and commercial outposts that will support future human activity in space. The table below lists the most prominent startups in the space infrastructure sector:

*Fig. 28: Overview of Startups in the Space Infrastructure Sector*

| COMPANY | LOCATION | DISRUPTION | TECHNOLOGY | MISSION | SOURCES |
|---|---|---|---|---|---|
| Axiom Space | **HQ:** Houston, Texas, USA | Commercial space stations | Developing the first commercial space station to replace the International Space Station (ISS). Initially, Axiom's modules will attach to the ISS before becoming an independent station | Axiom is setting the stage for future space tourism, research, and industrial activities in low Earth orbit | Company Homepage |
| Sierra Space | **HQ:** Louisville, Colorado, USA | Reusable spaceplane and habitats | Developing the **Dream Chaser**, a reusable spaceplane for cargo and crew transport to low Earth orbit, and the **LIFE** habitat, a modular, inflatable space station component | Sierra Space aims to provide commercial and research access to LEO in collaboration with Blue Origin on the Orbital Reef space station | Company Homepage |
| Varda Space | **HQ:** El Segundo, California, USA | Space-based manufacturing | Developing small, automated spacecraft to manufacture high-value products in microgravity (such as pharmaceuticals, semiconductors, and optical fibers) and return them to Earth | Varda is tapping into the unique advantages of manufacturing in space to create materials that are impossible to produce on Earth | Company Homepage |

## Propulsion and Energy

Several startups are developing advanced propulsion and energy technologies to power space exploration and in-space operations. These innovations are critical for enabling deep-space missions and long-duration activities in space. The table below summarizes the main companies operating in this segment:

*Fig. 29: Overview of Startups in the Space Propulsion Segment*

| COMPANY | LOCATION | DISRUPTION | TECHNOLOGY | MISSION | SOURCES |
|---|---|---|---|---|---|
| Impulse Space | **HQ:** El Segundo, California, USA | Affordable in-space propulsion | Provides in-space transportation, maneuvering, and orbital transfer services with innovative propulsion systems | Impulse Space is working on lowering the cost of moving payloads between orbits and facilitating deep space exploration | Company Homepage |
| Accion Systems | **HQ:** Boston, Massachusetts, USA | Next-gen electric propulsion | Develops tiny, scalable ion electrospray propulsion systems for small satellites and CubeSats | Their propulsion technology is designed to extend the lifetime of small satellites and provide precise attitude control for constellation management | Company Homepage |
| Orbit Fab | **HQ:** Lafayette, Colorado, USA | Space refueling stations | Building the "first gas stations in space" with orbital refueling depots to extend the life of spacecraft and enable long-duration space missions | Orbit Fab's vision is to create an orbital infrastructure that allows for routine refueling of satellites and other spacecraft, reducing operational costs | Company Homepage |

### 2.3.4 High-Altitude Balloons in the Space Industry

High-altitude balloons, or stratospheric platforms, are part of the **high-altitude platforms (HAPs)** market. They have emerged as an important technology in the space industry, providing a cost-effective means for scientific research, telecommunications, Earth observation, and space tourism. These balloons typically operate at altitudes between 18 to 40 kilometers, offering near-space access and enabling missions that would otherwise require satellites or rockets. This chapter explores the various companies using high-altitude balloons for diverse applications, from telecommunications to space tourism.

#### HAPs Market Size and Growth

The HAPs market is experiencing notable growth, driven by increasing demand across defense, telecommunications, and environmental monitoring sectors. According to Global Insight Services, the HAPs market is projected to grow at a compound annual growth rate (CAGR) of **10.4%** between 2023 and 2033. In 2023, the market size was valued at **$783.3 million**. The market is driven by advancements in technologies like surveillance systems, remote sensing, and communication services, particularly in regions like North America and Asia-Pacific, which are seeing strong investments in defense and telecommunication infrastructure. (2024)

This growth reflects the wide range of applications for high-altitude platforms, including their use as communication relays, surveillance tools, and platforms for scientific research. The expansion of HAPs is largely due to their ability to provide persistent, high-altitude coverage for sectors that rely on continuous data collection, such as agriculture, environmental monitoring, and disaster response. (Grand View Research, 2024)

When compared to the broader space economy, which is valued at around $570 billion in 2023 (Space Foundation Report, 2024), the HAP market represents a relatively small but rapidly growing portion. Traditional satellite and launch services still dominate the space industry, accounting for the bulk of market revenues. (Grand View Research, 2024)

### The Key Players in the HAPs Market

**Space Perspective** is a leading company in the high-altitude balloon-based space tourism industry. Their flagship product, the **Spaceship Neptune**, is a pressurized capsule that passengers board for a gentle, six-hour journey to the edge of space, carried by a stratospheric balloon. This near-space experience provides a 360-degree view of Earth from the edge of the atmosphere, allowing passengers to experience the curvature of the planet and the vastness of space without the use of rockets.

Space Perspective emphasizes accessibility and sustainability, offering a relatively low-impact way for travelers to experience near-space. With plans to launch from multiple locations, including the Kennedy Space Center, Space Perspective is democratizing access to the edge of space.

- Founded: 2019
- Headquarters: Merritt Island, Florida, USA
- https://spaceperspective.com/
- Key Applications: Space tourism, educational and research missions

**World View Enterprises** is a key player in the high-altitude balloon sector, offering both commercial and scientific services. Their **Stratollite** platform is designed for long-duration missions, providing cost-effective, high-altitude access for environmental monitoring, Earth observation, and remote sensing. The Stratollite can hold its position over a target area for extended periods, making it a flexible alternative to satellites.

World View also operates in the space tourism market with its **Explorer** capsule, similar to Space Perspective's offering. Explorer will take passengers to the stratosphere in a luxury cabin, providing them with a unique experience of Earth's atmosphere and the cosmos. In a funding round in 2018, the company managed to raise $26.5 million (Foust, 2018).

- Founded: 2012

- Headquarters: Tucson, Arizona, USA
- https://www.worldview.space/
- Key Applications: Space tourism, Earth observation, environmental and climate monitoring, communications platforms

**Zero 2 Infinity** is known for its innovative use of high-altitude balloons for both tourism and satellite launch applications. The company's **Bloon** platform allows passengers to ascend to the stratosphere in a pressurized capsule, providing a rocket-free near-space experience. Like other space tourism companies, Zero 2 Infinity aims to make near-space accessible for travelers seeking an eco-friendly alternative to rocket-powered spaceflight.

Beyond tourism, Zero 2 Infinity also provides balloon-based services for payload testing, satellite validation, and scientific research. Their balloons can lift small satellites and experimental payloads to high altitudes, offering a cost-effective and flexible method for pre-launch testing.

- Founded: 2009
- Headquarters: Barcelona, Spain
- https://www.zero2infinity.space/
- Key Applications: Space tourism, payload testing, satellite deployment and validation, research missions in near-space

**Raven Aerostar**, a subsidiary of Raven Industries, has decades of experience in the development and operation of high-altitude balloons. Their balloons are used for a variety of applications, including military surveillance, communications, and scientific research. Raven Aerostar specializes in high-altitude platforms (HAPs) capable of long-duration missions, providing persistent monitoring and data collection from the stratosphere.

The company works closely with defense agencies, using their balloons for intelligence, surveillance, and reconnaissance (ISR) missions. They also provide balloon-based systems for weather monitoring and atmospheric research, making them a versatile player in the high-altitude balloon space.

- Founded: 1956 (parent company: Raven Industries)
- Headquarters: Sioux Falls, South Dakota, USA
- https://aerostar.com/
- Key Applications: Military surveillance (ISR), weather monitoring and atmospheric research, communications platforms, remote sensing and environmental monitoring

**Near Space Corporation** offers high-altitude balloon services primarily for aerospace testing, scientific research, and remote sensing. Their balloon systems can carry payloads to near-space for missions such as testing space hardware, sensors, and technologies before launching them into orbit. Near Space Corporation's platforms allow researchers to simulate space-like conditions at a fraction of the cost of orbital missions.

The company has a long history of collaboration with NASA and other government agencies, providing reliable, flexible, and affordable balloon-based platforms for testing and research. They are also involved in testing reentry systems and advancing technologies for Earth and space observation.

- Founded: 1996
- Headquarters: Tillamook, Oregon, USA
- https://nsc.aero/
- Key Applications: Space hardware testing and validation, atmospheric and climate research, reentry system development, high-altitude Earth observation

**Stratodynamics Aviation** is focused on the use of high-altitude balloons for environmental research and unmanned aerial vehicle (UAV) launches. Their systems deploy UAVs from the stratosphere, allowing them to gather data on atmospheric conditions, climate, and weather patterns. This unique approach to balloon-launched UAVs provides valuable insights into the upper atmosphere and enables precise environmental monitoring.

Stratodynamics aims to provide customizable platforms for scientific research, leveraging their high-altitude systems to deliver critical data for climate and environmental studies.

- Founded: 2015
- Headquarters: Ontario, Canada
- https://www.stratodynamics.ca/
- Key Applications: Atmospheric data collection, climate monitoring and environmental research, UAV deployment from high altitudes

**Space Data Corporation** utilizes high-altitude balloons to deliver telecommunications and remote sensing services. Their **SkySites** platform, consisting of stratospheric balloons that act as floating cell towers, provides broadband and mobile coverage to remote and underserved areas. This balloon-based system is an affordable and rapidly deployable alternative to satellites, especially in regions where building traditional telecom infrastructure is impractical.

Space Data Corporation's balloon technology is also used in military and defense applications, providing secure communications and data transfer in remote areas or during emergencies.

- Founded: 1997
- Headquarters: Chandler, Arizona, USA
- https://spacedata.net/
- Key Applications: Telecommunications and broadband services in remote areas, military and defense communications, remote sensing and environmental data collection

**Sceye** is developing high-altitude balloon platforms that provide long-duration, near-space missions for telecommunications, environmental monitoring, and Earth observation. Their balloons can remain in the stratosphere for extended periods, offering persistent observation over large areas. This capability makes Sceye an attractive alternative to traditional satellites, particularly for applications like air quality monitoring and internet delivery in remote regions.

Sceye's systems can be used for real-time monitoring of pollution levels, providing governments and organizations with valuable data for environmental protection and disaster response.

- Founded: 2014
- Headquarters: Moriarty, New Mexico, USA
- https://www.sceye.com/
- Key Applications: Telecommunications and broadband delivery, environmental monitoring (air quality and pollution tracking), Earth observation and disaster response

**Altaeros** is known for developing tethered high-altitude balloon platforms, called **SuperTowers**, which provide mobile broadband and cellular coverage to rural and remote areas. Their aerostats are designed to float at high altitudes, serving as temporary cell towers that offer widespread coverage over large regions. Altaeros aims to bridge the digital divide by delivering affordable internet and cellular services where ground-based infrastructure is lacking.

Their systems are also used for disaster response and recovery, providing essential communication services when traditional infrastructure is damaged or inaccessible.

- Founded: 2010
- Headquarters: Somerville, Massachusetts, USA
- https://www.altaeros.com/
- Key Applications: Rural telecommunications and mobile broadband, disaster response communications, environmental and atmospheric monitoring

The space industry is undergoing rapid transformation, driven by advances in technology, increasing commercialization, and innovative start-ups. Launch service providers and satellite manufacturers play a crucial role in this ecosystem, enabling key services such as communications, Earth observation, and even space memorial services. Additionally, high-altitude balloon operators are providing cost-effective alternatives for near-space missions, from scientific research to space tourism.

**In the context of the space funeral market**, it is particularly important to monitor these businesses, especially companies operating in the **space tourism** sector and those developing **sustainable solutions** like reusable launch vehicles. These innovations not only shape the future of space travel but also open new possibilities for affordable and environmentally friendly space memorial services. As the market expands, with increasing emphasis on sustainability and commercialization, the space sector will continue to grow in both size and impact, offering novel opportunities for space exploration and memorial services.

# 3 THE POLITICAL SPHERE

The successful establishment and operation of a funeral business in space are contingent upon navigating a complex web of laws, regulations, and ethical considerations related to space activities. This section of the research explores the current legal framework governing space activities, including international treaties, national regulations, and emerging policies related to space exploration, space commercialization, aviation and the use of airspace. It examines how these laws and regulations impact the funeral industry, addressing issues such as the legality of space burials, environmental considerations, and ethical concerns surrounding human remains in space. By understanding the political landscape, the research aims to provide a comprehensive view of the regulatory hurdles and compliance requirements for operating a funeral business in near-space and space.

## 3.1 The Basics of Space Law

Space law is a complex and evolving field that governs the activities of nations and private entities in outer space. Several international and national agreements form the foundation of space law, ensuring that space remains a peaceful and cooperative domain for all of humanity.

### 3.1.1 International Agreements

The United Nations Office for Outer Space Affairs (UNOOSA) establishes the fundamental regulations for international space exploration. These agreements not only provide a historical regulatory framework for human access to space, but also lay the groundwork for all subsequent international and national efforts in formulating space-related regulations. The regulations are as follows:

**Outer Space Treaty (OST) – 1967:** The Outer Space Treaty is the cornerstone of international space law, establishing fundamental principles for the exploration and use of outer space. It sets the framework for peaceful activities, cooperation, and the prevention of national appropriation in space.

Key Points:

- Space is open for exploration by all countries without discrimination.
- It must be used for peaceful purposes only.
- No country can claim ownership over outer space or celestial bodies.
- States are responsible for space activities, including those by private entities within their jurisdiction.
- Countries must avoid contaminating space and celestial bodies.

**Rescue Agreement – 1968:** Complementing the OST, the Rescue Agreement focuses on international cooperation in assisting astronauts and managing space objects.

Key Points:

- Countries must provide aid to astronauts in distress and ensure their safe return.
- Space objects found on Earth must be returned to the launching state.

**Liability Convention – 1972:** The Liability Convention clarifies the responsibility of states for any damage caused by their space objects, establishing a liability framework for compensation.

Key Points:

- States are liable for damage caused by their space objects, both on Earth and in space.
- The launching state is responsible for compensating damages caused by its space objects.

**Registration Convention – 1976:** The Registration Convention increases transparency in space activities by requiring states to register their space objects with the United Nations.

Key Point: Launching states must provide information on space objects, including their purpose, orbit, and trajectory.

**Moon Agreement – 1984:** The Moon Agreement seeks to extend the principles of the OST to the Moon and other celestial bodies, emphasizing the need for equitable sharing of resources.

Key Points:

- The Moon and other celestial bodies are the common heritage of mankind.
- Resources extracted from these bodies should be shared equitably.
- The commercial exploitation of space resources is subject to international regulation.

**Please note:** The Moon Agreement has limited participation, with very few space-faring nations ratifying it.

### 3.1.2 Space Laws on National Level

While international treaties form the backbone of space law, individual countries have enacted their own space legislation to regulate the activities of national companies, agencies, and private actors in space. These national laws complement international agreements and reflect each country's unique approach to space exploration and utilization. The following information offers a brief overview of the most important national space regulations.

**United States:** The United States has established a robust legal framework to support its leadership in space exploration and commercial space activities.

- **Commercial Space Launch Act - 1984**: This act governs the U.S. commercial space sector, providing a licensing framework for private space launches. It supports the growth of the private space industry by regulating commercial space transportation.

- **Space Resource Exploration and Utilization Act - 2015:** This legislation allows U.S. citizens and companies to engage in the commercial exploration and use of space resources, including the mining of asteroids. It sets the stage for future resource extraction in space, reflecting the growing interest in space mining.
- **U.S. Space Policy Directives (SPD):** A series of directives that outline the country's strategy in space exploration. These include policies on human space exploration, national security, and the management of space traffic, positioning the U.S. as a leader in addressing the complexities of space governance.

**European Union:** The European Union (EU) and its member states work together under a collaborative framework to develop their space activities.

- **ESA (European Space Agency) Convention - 1975:** This convention governs cooperation among European nations in space activities, creating a unified approach through the European Space Agency (ESA). The agency coordinates research, satellite programs, and space exploration missions.
- **EU Space Policy:** The EU's space policy includes guidelines for fostering the development of the commercial space industry and emphasizes cooperation with other space-faring nations. The EU's satellite navigation systems, such as Galileo, are pivotal to its space strategy, showcasing the region's capability in space technology.

**Please note:** **Italy** is the **first European Union country to pass a comprehensive national space law.** In June 2024, Italy's Council of Ministers approved the first national framework law focused on space and the space economy. This legislation regulates both national and foreign operators involved in space activities from Italian territory, requiring proper authorization and insurance coverage for space incidents. Additionally, the law establishes the **National Plan for the Space Economy**, aiming to promote innovation and public-private partnerships in the space sector. The Italian Space Agency (ASI) is tasked with overseeing compliance and managing the registration of space objects. This legislative move positions Italy as a leading force in Europe,

setting a precedent for other EU countries to follow in formulating their own comprehensive space laws.

**Russia:** Russia maintains a comprehensive legal and policy framework for space exploration, reflecting its long history and continued focus on space activities.

- **Russian Space Law - 1993:** This law governs Russia's national space activities, including the regulation of commercial entities involved in space exploration. It sets rules for private and governmental space endeavors, reflecting the country's commitment to maintaining its position as a key player in the space industry.
- **International Cooperation and Security:** Russia is a major participant in international space agreements and continues to prioritize space security and collaboration with other nations, highlighting the country's strong focus on maintaining global space partnerships.

**Please note:** The **war in Ukraine since 2023 has severely impacted Russia's space activities**, particularly in international cooperation. ESA cut ties with Russia, delaying joint projects like the **ExoMars mission**, now postponed to 2028. Commercial ventures were also hit hard, with companies like OneWeb shifting launches from Soyuz to other providers. Russia's launch volume dropped significantly due to sanctions. However, the country continues to collaborate on the ISS, though it may exit the partnership after 2024 and focus on independent projects or collaborations with China.

**China:** China has rapidly expanded its presence in the space sector, developing policies and frameworks to support its ambitious space goals.

- **China's Space Program White Papers:** These papers detail China's strategic vision for space exploration, with a strong focus on international cooperation and building a competitive commercial space industry. The white papers guide the country's long-term goals and establish China as a growing leader in space technology.

- **International Participation:** China is increasingly involved in international space forums and agreements, emphasizing its commitment to global cooperation while advancing its technological and commercial leadership in space.

**India:** India is an increasingly important player in the global space sector, with space laws that support its dynamic and cost-effective space exploration programs.

- **Space Activities Bill (Draft 2017):** While still in draft form, this bill aims to regulate India's space activities, including private sector involvement. It focuses on licensing, liability, and the commercialization of space ventures, aligning with India's growing ambitions in space exploration and satellite technology.
- **Indian Space Research Organisation (ISRO):** India's national space agency operates under a legal framework that supports India's growing role in satellite launches and exploration, particularly with its focus on cost-effective space missions.

**Japan:** Japan has a strong space policy framework that promotes both governmental and private sector involvement in space activities.

- **Basic Space Law – 2008:** This law provides a foundation for Japan's space exploration activities, emphasizing the development of space technologies and the peaceful use of outer space. It also encourages private sector participation in space ventures.
- **Japan Aerospace Exploration Agency (JAXA):** Japan's national space agency operates under this legal framework, advancing the country's efforts in satellite technology, exploration missions, and international partnerships.

### 3.1.3 Emerging Topics in Space Law and Regulation

Emerging challenges like space debris, space mining, and space militarization require ongoing evolution of space law to ensure the peaceful and sustainable use of outer space. This section provides a brief overview of new space law issues.

**Space Resource Utilization and Mining:** The legal landscape for space mining is evolving, with key countries (such as the U.S. and Luxembourg) passing national laws that recognize the rights of companies to extract and own resources from space. However, there is no comprehensive international agreement on space mining, and it remains a contentious issue in global forums.

**Space Debris:** As space traffic increases, concerns over space debris (defunct satellites, discarded rocket stages, etc.) have led to calls for stronger regulation. The **United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)** and **Inter-Agency Space Debris Coordination Committee (IADC)** have issued **Space Debris Mitigation Guidelines**. These guidelines aim to minimize debris generation from satellites and spacecraft but are not legally binding. Operators are encouraged to remove satellites from orbit at the end of their missions to reduce debris buildup. Furthermore, several countries and agencies are developing technologies to actively remove space debris, such as capturing defunct satellites. Though still evolving, **Active Debris Removal (ADR)** is a critical part of space sustainability.

**Emissions and Environmental Issues:** Space launches contribute to pollution through the emission of particulate matter and gases in the stratosphere. Some rockets use toxic propellants (e.g., hydrazine), posing environmental risks. More sustainable fuels like liquid oxygen and methane are being developed to mitigate these impacts. Countries and private companies are working toward **sustainable space practices**, including reusable rockets and more efficient propulsion systems, which reduce the environmental footprint of space activities. These efforts align with international and national space regulations aimed at minimizing harmful contamination of the Earth and space environments.

**National Security and Space Militarization:** The OST prohibits the placement of weapons of mass destruction in space, but military use of space, especially in satellite technologies, is becoming a critical area of concern. Recent developments, such as the formation of the U.S.

Space Force and increasing investment in anti-satellite weapons by several countries, have prompted discussions about updating space law to address military tensions in space.

**Space Traffic Management (STM):** The increasing number of satellites and space activities has led to calls for better regulation and management of orbital paths to prevent collisions.

**Private Sector Role:** Companies like SpaceX, Blue Origin, and others are driving commercial space activities. This has prompted discussions on how national laws can be harmonized with international treaties to foster innovation while ensuring compliance with safety, environmental, and ethical standards.

**Human Settlement on Mars:** While human missions to Mars are still in the planning stage, there are ongoing discussions about the legal implications of long-term human presence on other planets.

Space law forms a vital framework for governing both governmental and private activities in outer space, ensuring that space exploration remains peaceful and cooperative. International agreements and national regulations establish guidelines for the responsible use of space, the protection of celestial bodies, and the equitable sharing of space resources.

With the increasing commercialization of space activities, including funeral and memorial services held in space, it is crucial to adhere to these laws. Space memorial services will need to consider international treaties and national laws governing space activities to ensure they are conducted lawfully, ethically, and sustainably. Compliance with these regulations will be essential to avoid issues related to space debris, environmental contamination, and the commercial use of outer space.

## 3.2 Aerospace and Aviation Laws

As highlighted in chapter 2.2 of this section, space funeral services can operate in near-space rather than deep or outer space. The regulatory framework to consider in these cases would be that governing activities in "air" or near-space. When discussing **aerospace law and regulations**, both national and international frameworks must be considered. Aerospace activities, particularly those involving drones, high-altitude balloons, and similar objects, are regulated by a combination of **aviation law**, **aerospace law**, and **space law**, with a primary focus on safety, airspace sovereignty, and air traffic management. Below is an overview of the key laws and regulations relevant to the aerospace industry, including drone operations and high-altitude objects.

### 3.2.1 International Framework for Aerospace

**Chicago Convention – 1944:** The Convention on International Civil Aviation is the foundational treaty that established the **International Civil Aviation Organization (ICAO)** and governs the use of airspace and air travel between nations.

Key Points:

- Sovereignty: Every country has complete and exclusive sovereignty over the airspace above its territory.
- Air Traffic Rules: Establishes international standards and regulations for air traffic to ensure safe and orderly development of aviation.
- Airspace Use: Requires coordination between countries for the use of airspace, especially in international airspace.

**International Airspace Regulations by ICAO:** ICAO sets the global standards for aviation, including the regulation of **Unmanned Aerial Vehicles (UAVs)** or drones, and other aerospace objects.

Key Points:

- Annex 2 of the Chicago Convention: Sets rules of the air, including minimum safe altitudes, air traffic control, and collision avoidance.
- ICAO is working on integrating Unmanned Aircraft Systems (UAS) into the global air traffic management system.
- ICAO issues guidelines for **Remotely Piloted Aircraft Systems (RPAS)**, but regulation at lower altitudes is often handled by national authorities.

### 3.2.2 National Regulations for Drones and High-Altitude Balloons

Each country typically implements its own regulations for airspace use, particularly for drones, balloons, and similar objects, at lower altitudes. This section offers an overview of nation-based laws.

**United States:** Key institution of the U.S. airspace is the **Federal Aviation Administration (FAA).** The FAA regulates all airspace in the U.S., including the use of drones and high-altitude objects, as follows:

**FAA Part 107 Drone Regulations** govern the commercial use of drones, including weight limits, altitude restrictions, and pilot certification.

Key Points:

- Drones must weigh less than 55 pounds (25 kg).
- Must remain within the visual line of sight of the operator.
- Maximum altitude of 400 feet (120 meters) above ground level.
- Must not fly over people or moving vehicles.
- Requires certification for commercial drone pilots through the Remote Pilot Certificate.

- Flights near airports or controlled airspace require FAA authorization.
- **Beyond Visual Line of Sight (BVLOS)** operations are only allowed with special FAA waivers.

**FAA Part 101 High-Altitude Balloons and Weather Balloons** covers unmanned free balloons and kites, model rockets, and other lighter-than-air objects.

Key Points:

- Balloons must have a tracking device to monitor their altitude and position.
- For balloons that reach certain altitudes, operators must notify **Air Traffic Control (ATC)** before launch.
- Flights at or above 60,000 feet (18 km) are generally classified as high-altitude and require special coordination with ATC.

**European Union:** The **European Union Aviation Safety Agency (EASA)** regulates civil aviation in the European Union, including UAVs and high-altitude objects, as follows:

**EU Drone Regulations (Regulation (EU) 2019/947 and 2019/945)** classify drones into categories based on risk.

Key Points:

- Drones are classified into categories based on risk: Open, Specific, and Certified categories.
- Open Category: For drones up to 25 kg, generally limited to a maximum altitude of 120 meters (400 feet).
- Specific Category: Requires authorization for higher-risk operations, such as flying near people or at higher altitudes.

- Certified Category: For operations involving high-risk (e.g., cargo drones or those operating over urban areas).
- Registration is required for operators of drones above 25 kg or if they are equipped with a camera.

**EU High-Altitude Balloons Regulations (Regulation (EU) No 923/2012)** cover common air-space rules across the EU and therefore include high-altitude aircraft.

Key Points:

- Operators must notify the relevant aviation authorities (such as **Eurocontrol**) when launching high-altitude balloons.
- For flights exceeding certain altitudes (typically 60,000 feet), special permissions and safety measures are required.

**China:** The **Civil Aviation Administration of China (CAAC)** regulates drone operations and high-altitude balloons, requiring registration and special permissions for high-risk activities, such as:

Drone Regulations:

- Drones weighing over 250 grams must be registered with the CAAC.
- Operators must obtain a UAV pilot license for commercial use.
- Drones are restricted from flying near airports, military facilities, and densely populated areas.
- The maximum altitude for drones is 120 meters (400 feet), and BVLOS operations require special approval.

High-Altitude Balloons: Operators must seek permission from the CAAC before launching high-altitude balloons, and these must be tracked to prevent interference with aviation.

**Russia:** The **Federal Air Transport Agency (Rosaviatsiya)** regulates Russian airspace, as follows:

Drone Regulations:

- Registration is required for drones weighing more than 250 grams.
- Commercial drone operators must be licensed.
- Russia imposes restrictions on flights near urban areas and critical infrastructure.

High-Altitude Balloons: High-altitude balloon launches require permission from Rosaviatsiya, and balloons must be equipped with tracking devices to avoid interference with aircraft.

### 3.2.3 Airspace Classification and Safety Regulations

According to ICAO Standards, airspace is classified into various categories (A through G), which determine the level of air traffic control and restrictions. Airspace is divided into controlled (Class A, B, C, D) and uncontrolled (Class E, F, G) categories. Small airplanes generally operate in lower classes of airspace (Class E and G), where less air traffic control interaction is required. Drones and high-altitude balloons typically operate in Class G airspace (uncontrolled), but operations in other classes require coordination with air traffic controllers.

UAVs, balloons, and similar aerospace objects must comply with safety requirements to avoid collisions with aircraft. This includes transponder use, lighting, and communication with air traffic control. Moreover, some countries impose environmental restrictions on the use of high-altitude balloons and drones, particularly when operating in sensitive areas or near protected wildlife. For example:

Small aircraft can typically fly under Visual Flight Rules (VFR), where pilots rely on visual references for navigation and control. VFR flights are restricted by weather conditions and require good visibility.

Small aircraft that are equipped for Instrument Flight Rules (IFR) can fly in controlled airspace and poor visibility, but pilots must be instrument-rated.

### 3.2.4 Future Trends and Emerging Regulations

**Urban Air Mobility (UAM):** With the rise of aerial vehicles such as air taxis, new regulations are being developed to manage operations in urban environments.

**High-Altitude Platforms (HAPS):** These are unmanned aerial systems designed to operate at altitudes of around 20 km for long durations. As the use of high-altitude platforms increases, so do concerns over environmental impact and airspace safety. Regulations require that high-altitude balloons be tracked to prevent interference with aviation and to minimize any risk to the environment or airspace.

**Spaceports and Suborbital Flights:** As commercial space tourism grows, countries are developing regulations for suborbital space flights that cross into the upper layers of the atmosphere (e.g., SpaceX's Starship or Blue Origin's New Shepard).

**Emissions Regulations:** The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) aims to stabilize aviation $CO_2$ emissions. Airlines are required to offset emissions by purchasing carbon credits, contributing to global efforts to reduce aviation's environmental impact. In Europe, the EU Emissions Trading System (EU ETS) has a similar goal.

**Aircraft Noise Standards**: The International Civil Aviation Organization (ICAO) sets limits on aircraft noise and emissions (Annex 16 of Chicago Convention), including for carbon dioxide ($CO_2$), nitrogen oxides (NOx), hydrocarbons (HC), and carbon monoxide (CO).

**Sustainable Aviation Fuels (SAF):** Governments and international bodies, including ICAO, promote SAF as an alternative to traditional jet fuel to reduce the aviation sector's carbon footprint.

## Close-Up: Handling Cremated Remains – Sending Ashes into Space

In addition to the complex regulatory frameworks for space and aviation activities, the handling of cremated remains is subject to specific laws related to cremation and the disposition of ashes. Generally, the classification of cremated remains as **non-hazardous** is valid in many parts of the world, particularly in countries like the United States, European Union, Canada, and Australia, where ashes are commonly treated as non-hazardous material. Therefore, there are no explicit prohibitions against sending ashes into space or near-space.

However, businesses must comply with relevant aviation and space regulations and adhere to guidelines for commercial payloads. Similarly, scattering ashes in the stratosphere via high-altitude balloons is generally permitted, provided it complies with airspace and environmental regulations, as discussed previously in this chapter.

**Cultural and Environmental Considerations**

Scattering ashes must not create space debris or pose a risk to space activities. Additionally, some countries and regions have specific cultural or religious practices around the treatment of cremated remains, which may influence the legal or ethical framework for scattering ashes. For example, in Japan, while cremation is widely accepted, scattering ashes outside traditional burial sites may require special permissions. Similarly, environmental regulations play a crucial role in the legality of scattering ashes. Stratospheric releases or space launches of ashes must not pose environmental risks, such as polluting protected ecosystems or violating local airspace policies.

For example, in the United States, the **Clean Water Act (CWA)** restricts the scattering of ashes in inland waterways and requires that ashes be scattered at least **three nautical miles offshore** to prevent harm to marine ecosystems. In Europe, France's **Environmental Code** mandates that scattering ashes near **Natura 2000** protected sites, which are important for preserving biodiversity, may be restricted. In the UK, the **Marine and Coastal Access Act** limits activities in **Marine Conservation Zones (MCZs)**, ensuring that ashes are not scattered in areas critical for marine conservation.

## KEY MARKET TAKEAWAYS

1. **Aging demographics** and the growing "Silver Economy" are driving demand for personalized and innovative funeral services, particularly among individuals over 65 years of age

2. Countries that prioritize **technological innovation** are likely to embrace space funerals, with Switzerland, the U.S., and Sweden leading global innovation rankings

3. Consumers are increasingly valuing **unique, experience-driven services**, aligning with trends like the **experience economy**, personalization, and sustainable practices

4. **Farewell rituals are essential** for providing closure. Space funerals offer a modern, symbolic way to honor this need, appealing to both non-religious and spiritual clients

5. **The Upward Movement** taps into the human instinct to look and move upwards, providing a symbolic and natural farewell that resonates emotionally with all beliefs

6. **Cremation rates** are steadily rising worldwide, with countries like Japan nearing 100% and regions like North America and Europe seeing a shift away from traditional burials

7. **Sustainability** is an emerging focus, with eco-friendly and green burial options gaining popularity as consumers become more environmentally conscious

8. The **space funeral segment** is still in its early stages, with limited competition globally, but it presents significant growth potential, particularly as interest in space exploration and symbolic tributes continues to rise

9. **Steady growth in both the global funeral and space industries** presents strong opportunities for LERO, as rising cremation rates and interest in space exploration create demand for innovative, alternative memorial services

10. **Government support for space initiatives** and favorable space policies in countries like the U.S., Luxembourg, and Switzerland create a positive environment for the growth of space-related services, including space funerals.