
The Challenges of Planning a Science Museum

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Having recently written a rigorous “Master Plan” [1] for the upcoming European Southern Observatory (ESO) Supernova Planetarium & Visitor Centre in Garching [2], we have gained interesting insights into the challenges of planning a science museum. This article uses the ESO Supernova as a case study to define an organisation’s “DNA”. The article also discusses how to best match the activities/objectives of a science museum with its available financial resources and manpower.

1. Introduction: the Landscape of Outreach Pitfalls

As practising science communicators we work in a beehive, buzzing with constant activity. By taking part in a Symposium like the International Symposium on the NAOJ Museum in Mitaka, Tokyo, we get a chance to “take the helicopter” and reflect on what we do in our busy day-to-day operations.

Flying high over the world of astronomy outreach we have pinpointed 10 significant challenges that impede upon our daily progress, or represent issues that require special care and attention:

1. **Forest of Fragmentation:** How can we — in our daily communication work — overcome fragmentation in terms of the languages and cultures of our target groups in order to realise our full potential?

Astronomy, as a science, transcends boundaries. But currently, in all too many cases, the activities and best practices of astronomy education and public outreach (EPO) do not identify the fragmentation of their target groups, nor do they ensure that relevant materials are adapted for other languages and cultures.

2. **Translation Table Mountain:** As an outcome of this fragmentation, how can we extend into those territories in which English, or our usual language, is not the *lingua franca*?

The simple answer is that we need to invest in translations. This can be achieved in a variety of ways, for instance by outsourcing translations to an external company or through win-win partnership networks that translate and adapt content. Examples of such practices include the ESO Science Outreach Network (ESON, [3]), the ESA Country Desks [4], and the ESA European Space Education Resource Office network (ESERO, [5]). Within Europe, it would even make sense to consider the creation of a Europe-wide “expert service structure”. This network could support individual projects on a local level, through the translation, adaptation, audiovisual production, and dissemination of their outreach materials.

to expand and lead in their field. This could also help potential fund-raising efforts.

Many of the same, or similar, methods and tools are utilised when communicating towards different target groups. A coherent communication strategy towards all target groups increases the likelihood that you can achieve the critical mass for manpower, which is crucial in avoiding single-point failures and leads to increased efficiency. A solid, and complete matrix of target groups versus products, using real data in deciding which product/service has the highest return on investment, can also be produced. Covering all target groups in the same communication unit makes it possible to design cohesive promotion and proactive distribution plans for all of your products.

5. **Sea of Change:** How can we accommodate the raging seas of change in society?

Target groups, channels and technologies have all changed. The millennials (generation Y, see below) are now an increasingly important target group. There has also been a large shift upwards — to high-bandwidth video and increased video and still image pixels/resolution — and downwards — to lower bandwidth mobile devices like smartphones and tablets (with rapidly increasing bandwidth for mobile applications, as well). To adapt to these changes, it is necessary to be flexible, swift and to tackle new situations. Listen to criticism, see it as a symptom and not a cause, and respond to it strategically by solving the problem at its root. As the world around us changes, it is important to have a fix-point. This is where a solid organisational DNA (see below) plays an important role, as it defines your foundation and boundary conditions.

6. **Cape Co-creation:** How can we accommodate the needs of millennials who demand co-ownership and want to — on their own terms — be involved in, and collaborate during, the communication process?

We need to learn to let go of control! We need to design campaigns that involve the community in two-way communication and gives them co-ownership of part of the process. This can be done with competitions, social media, unconventional communication [8] and citizen science projects, in addition through volunteers and crowdsourcing, allowing open access, and applying liberal (Creative Commons) licenses to image and video assets (see below).

7. **Licence Lagoon:** How can we ensure the efficient exploitation of our communication products by all target groups?

One of the easiest ways to get your materials “out there” is to allow others to use them. In practice, this means applying a liberal Creative Commons Attribution licence to your communication products. However this simple measure comes at a cost, often requiring considerable control over the materials to be relinquished (read more in [9]). This allows for adaptations and the commercial exploitation of the materials (for example, if your materials are uploaded to Wikipedia).

8. **Channel of Proliferation:** How can we accommodate dramatic changes in the media landscape due to the proliferation of new communication vehicles like social media? And how can we adapt to the shift from a select group of scientists, authors, journalists and editors as the information gatekeepers to the public as the new curators of knowledge?

The first step towards any change is to realise what is happening in the outside world by continuously researching new tools and platforms. Have a

clear set of criteria when selecting new platforms to expand your portfolio, and utilise good people who can easily navigate social media but also have a strategic mind that can deal with issue management. Problems will inevitably find you through the many ears and eyes of social media, but this is not necessarily a bad thing.

9. **Authenticity Abyss:** How can we remain authentic and scientifically correct in a world that is moving towards increasingly sensationalised media and worldviews?

First and foremost, we need to have rigorous quality control that involves “real” research scientists and/or outreach astronomers on staff in communication teams, in addition to a clear evaluation process. It is important to separate public information officer (PIO) and outreach astronomer roles as they pull in different directions.

10. **Collaboration Crevasse:** How can we break down the barriers in internal and external collaborations?

Ensuring smooth and transparent internal communications is one of the most important things to arrange. This can be done in a number of ways that fit the ground-rules of the organisation and the needs of the people. In recent years, a variety of very useful, collaborative tools have been developed that enable a highly efficient workflow, including cloud documents and spreadsheets (such as Google docs), joint calendars, joint network filers, and instant messaging and video conferencing tools like Skype. Also worthwhile mentioning is the advantage of building awareness of the full end-to-end project cycle: conceive, specify/brief, implement, iterate, approve, publish, test, promote and evaluate.

2. About the ESO Supernova

An example of how ESO applies these principles can be found in the ESO Supernova — Planetarium & Visitor Centre. Developed by the Klaus Tschira Stiftung, the Heidelberg Institute for Theoretical Studies and ESO, the ESO Supernova will be a visionary planetarium and astronomy exhibition based on common local, regional and international synergies identified by the involved organisations.

Located at ESO’s Headquarters in Garching bei München, Germany, the centre will provide German, European and international students and visitors with an immersive experience, leaving them in awe of the Universe we live in and proud of the scientific breakthroughs and cutting-edge facilities Europe has built in the Southern Hemisphere. ESO Supernova content will mainly address students, teachers, and the general public — both local and international — but it will also serve secondary target audiences such as astronomy enthusiasts and professional scientists (incl. staff) and their families, as well as prospective employees and partners.

The centre will provide an unforgettable learning experience, where even the most abstract and complex topics in astronomy and physics are innovatively visualised and explained. An education strategy will ensure that exhibits and activities are in accordance with German and international curricula and will support teachers’ class activities. The ESO Supernova will also strive to connect with teachers and relevant players in education, and encourage global resource sharing.

Using inspirational and engaging methods based on authentic scientific data, the ESO Supernova will connect people to the Universe we live in and to the scientists that explore it every day; uniting science and art, local and global communities, and the Southern and Northern hemispheres.



Fig. 2 The exterior of the ESO Supernova — Planetarium & Visitor Centre.

The ESO Supernova will deliver this experience through 2200 m² of engaging, interactive and virtually enhanced exhibitions and a modern planetarium in which shows are displayed on a 360-degree, 14-metre dome. It will also host guided tours, workshops and activities for schools. The centre will also accommodate two seminar rooms, a foyer, cafeteria, shop, picnic area, cloakroom, office and storage spaces, and a public observatory.

The ESO Supernova will be open 55 hours/week, 6 days/week (Tuesday-Sunday), with entrance and shows available to all members of the public free of charge. Content in the ESO Supernova will be provided in German and English. Activities will be supported by 2 ESO staff full-time equivalents (FTEs) and around 8.5 FTE contractor/in-kind/volunteer manpower. A strategy will establish how the ESO Supernova can attract, retain and reward its vital team of volunteers.

The total operating budget is estimated at ~ 1.1 M€/year, with ESO’s ordinary internal contribution capped at 250 k€/year. External funding, sales, volunteers and in-kind contributions will compensate for the difference. A fundraising strategy will ensure the necessary financial support for operations, offering partnerships ranging from corporations to individual supporters.

After the “honeymoon period” (the first 1–2 years), an average of 50 000 visitors are expected per year, including 20 000 school students. Promotional and marketing strategies will ensure the maximum possible audience is reached, whilst an events strategy will make the ESO Supernova the host of choice for public, cultural, scientific and corporate events.

3. The Organisational DNA

A Master Plan for the ESO Supernova now defines the high-level organisational DNA of the facility, including definitions of its core vision, mission and objectives. This document serves to combine the expectations and plans for all involved in the project team. It acts as the foundation for strategic decisions regarding content, budget, sponsorships, and also visitor experiences in the planetarium, exhibition, public observatory, shop and more. Objectives are considerate to the overall financial and practical limitations of the project. Here follows an overview of the

most important components of the organisational DNA of a museum:

- **Organisation**
 - **Your Vision:** Describe in a phrase what you want to achieve. The desired future state: Where are you in 10 years? How does your project fit into the bigger context?
 - **Your Mission:** Describe in a few phrases how you plan to achieve your vision. What is it that you do?
 - **The values you promote:** Select 3 to 5 values you want to promote.
- **What SMART objectives are you trying to achieve?** They need to be S (specific), M (measurable), A (achievable), R (realistic), T (timely). Define the key performance indicators for each objective.
- **Who is your target audience?** Write a profile of each target group (age, education, catchment area etc.). What cultural considerations do you need to take into account?
- **Visitors:** What is the gallery capacity? What is the duration of a normal visit? What circulation do you expect?
- **The visitor experience:** What feeling will your audience leave the exhibition with? What are your General Learning Outcomes? What skills will people acquire during the visit? What attitudes will the visit inspire? What behaviour will the visit encourage?
- **Content and interpretive approach:** Define the overall concept of the exhibition. What is your interpretative approach? What are the main themes of your exhibition? Describe how you are going to present the information. What is the enjoyment, inspiration and creativity of the visitors?
- **Design approach:** Write here any key design features and any additional facilities.
- **Design challenges:** Are there any accessibility issues you should take into account and how can you address them? What assets or collections (objects, resources, space, expertise) do you have? Are there cultural considerations to be addressed? In which languages are you going to deliver the content? What considerations should you have for a sustainable design?
- **Schedule:** Define a schedule to ensure that common goals are reached at agreed times.
- **Budget estimate:** Define cost planning area by area, or function by function.
- **Management and approvals:** Key roles and responsibilities: who is in charge of what? Define the frequency and type of internal communication and meetings, progress reports and approvals.

After completing a Master Plan containing the Organisational DNA of your facility, the implementation phase can begin. From the experience of the ESO Supernova, it can help to make a “strawman programme” for all activities as early as possible (in our case, two years before opening). It is easier to define and control where you need to head, and makes it possible to align objectives with the manpower and financial resources available, once realistic activities (both in number and type) for the facility have been chosen. If one of these three components changes during the planning and implementation process, the other two will need to be adjusted as well. Like a triangle with the vertices connected by rubber bands.

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