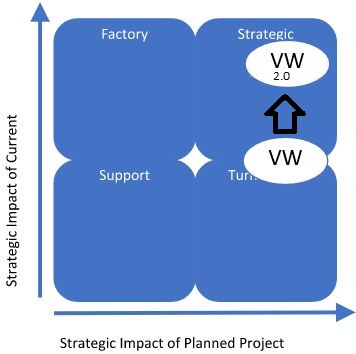
**Portfolio Performance monitoring plan**

**Company positioning, Portfolio goals and objective**

The portfolio is focused on the development of new technologies that will push the organization from a turnaround position to a strategic one, becoming leader in innovation and technology.

The reason behind this choice consists in the fact that the Volkswagen brand suffered a heavy attack in terms of reputation and sales during the “diesel gate” scandal; Therefore, investments in innovation and technology will lead VW group to recover the brand image loss and re-ingrain in customers the perception of a group that invests to protect the environment through technology.

Besides, through this portfolio execution VW group wants to move from a turnaround position to a strategic one from a technological point of view; the high risk/high return projects will help the group to achieve others strategic goals such as transformation of core business and improvement of smart mobility offer.



Organization Value Areas KPI degree of strategic alignment measurement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Value areas | Transform core business | Build mobility solutions business | Strengthening innovation power | Synergic benefit |
| Component/ KPI | * Core business of the new competitor | * Revenues from the developed technology | * % of capital invested in innovation activities * ROI | * SPI reduction due to other components * CPI reduction due to other components |

Each project and component has different metrics and KPIs to indicate how the component is aligned with the established goal. However, over the KPI, goals, and metrics of each project and component, the above grid indicates some portfolio KPIs to monitor how the project benefits and outcomes are still aligned with the portfolio areas of interest.

**Transform core business**

Since a technologic portfolio wants manage benefits from project to gain more benefits or improve the impact of them on the portfolio organization and the organization in general, to measure the core business transformation is a crucial indicator of the achievement of this goal.

* Core business of the new competitor: the innovation will definitely affect the competitors set: the core business of the new potential competitors represents a transformation of Volkswagen core business. Therefore, the components of the portfolio will look at which competitor are they addressing and indicate them as a changing factor.

**Build mobility solutions**

The Volkswagen core strategy point at the transformation of the core business through the ideation and creation of new technologies (reason why it is investing in this technological portfolio).

Revenues and profit from the developed technology: show if the market size of the developed technology is big enough to support the investment and (see next value area) it will have a consistent Return on investment.

**Straightening innovation power**

From an insider point of view technology affect the different phases of an organization. From an outsider it is perceived with a new and different product. Therefore

ROI: this KPI with its goal wants to show if the investment in the component feasible and aligned with general portfolio ROI it gives to innovation management fiscal discipline and help justify and recognize the value of strategic initiatives, programs and the overall investment in innovation.

% of capital invested in innovation activities:

**Synergic benefits**

Since the objective of the portfolio is to manage and monitor benefits to achieve strategic benefits.

SPI and CPI reduction due to other components: a component could lead the organization and therefore other components to achieve outcomes and benefits earlier, therefore the incidence on the scheduled time and costs performance it considered a strategic benefit (see appendix benefit/KPI/Goal tables where it is shown with colors the effect of the actual component e.g. the red column).

**Portfolio Governance model**

The Portfolio Governance board is established to overview, manage, and control the portfolio projects, programs and activities. It will be made by five senior managers picked from and for each different area of interest.

The Governance board will oversee:

* Track benefits
* Indicate who is going out of boundaries (through KPIs and metrics)
* Suggest modification to project/program managers to return on-track.
* Phase gate reviews: to check the strategic alignment of the components, check the opportunity and threats, benefit assessment. The standard cadence of those reviews will be monthly, plus once a semester. However, the Governance board may ask for timely customized reports. The content of the phase gate reviews report will be concerned on the ended component and therefore will contain:
  + Measurement of the actual benefits level with expected ones
  + Measurement of the actual level of risk (is still acceptable? Should we close the project, DSS will be helpful)
  + KPIs and metrics (expected and actual) for each components (new and old). Those reports should indicate the actual and expected level of alignment to the portfolio area of interest, through the level of portfolio KPIs and component KPIs level.
* Initiation of the portfolio
* Approval of the portfolio plans and modification
* Guidance on issues that program managers are unable to resolve

Reports and phase gate reviews are expected also after the achievement of each mile stone and project completion, to track the benefits for those components that will produce effects after the completion.

**Strategic change framework**

For the entire presented project, the change is intrinsic. Therefore, for those projects who will be picked, a change committee is essential and crucial to identify the best strategy to achieve and make the change being accepted. The committee will be composed by three senior managers which have matured high skills and knowledge in change management. This committee will report to the governance committee that will play a control role in the change management. Some KPIs are required to monitor the workforce behavior toward the change such as absenteeism rate, complaints about the new models, number of accidents due to the change.

All the presented projects require resources. Some of those projects could deliver value, benefits and outcomes in a relative short, medium, and long period.

* Short:
  + Communication app
  + Augmented reality projects
* Medium
  + 3d printed car parts,
  + Virtual reality
  + Smart monitoring
* Long
  + Artificial intelligence
  + Brain Computer Interface

Using the prioritizing tool, the portfolio management want to decide which benefits and outcomes are necessary and what are the minimum requirements to pick new components and/or to decide to prosecute or to close projects to reach the strategic goals, or in other words, to occupy the strategic position in the car market as a technological innovator. Therefore, a comparison with the risks, assumptions and constraints log is the key to understand which could be the best choices. Talking about assumptions, there is one that is common in all the projects, the capability to recover the loss of reputation due the “diesel gate” scandal.

**Organizational process asset**

**Enterprise environmental factors (EEF)**

There are any factors both internal and external that could influence the ongoing development of projects and benefits.

* Internal
  + Board favorable to the development of new and breakout technologies (+)
  + Human resources and workers are enough prepared to accept the change in the case one or more of those technologies will be part of the car production
  + Affordability of the technology
* External
  + Acts of God
  + Law and regulations
  + Community acceptance of the new generation models

Each project or program of the portfolio will take care of those factors building contingency plans by entering into insurance contracts that take care of all high risks factors (over the 10% of probability).

**APPENDIX**

Costs description, funding and resource requirements (appendix)

The organization should cover at least 70% of the costs of projects, the rest should be completed in partnership with other companies that have experienced knowledge in the required fields (research centers and universities, software houses etc.)

* Portfolio

|  |  |
| --- | --- |
| Portfolio governance board (per year) | $700.000 |
| Office supplies | $250.000 |
| DSS development | $900.000 |
| Total | $1.050.000 |

* 3D printing resource schedule and costs, funding $4.59 Billion from mortgages.

|  |  |
| --- | --- |
| Materials for the 3D printing |  |
| Engineering workforce for printer’s ideation and construction |  |
| Account workforce for the cost reduction analysis |  |
| Facilities |  |
| Machinery |  |
| Office supplies |  |
| Printers Prototypes |  |
| Project managers et al |  |
| Software licenses for the material simulation |  |
| Total | $15.3 Billion |

* Artificial intelligence, $4.11 billion from partnerships

|  |  |
| --- | --- |
| Computer science engineering workforce |  |
| Office supplies |  |
| Mathematicians |  |
| Project management |  |
| Facility |  |
| Project coordinator and analyst |  |
| Total | $13.7 Billion |

* Augmented reality, $2.76 billion from partnerships

|  |  |
| --- | --- |
| R&D | $3.5 Billion |
| Salaries | $1.5 Billion |
| Manufacturing & warranty | $4 Billion |
| Marketing | $0.2 Billion |
| Total | $9.2 Billion |

* Virtual reality, $3 billion from partnership

|  |  |
| --- | --- |
| Salaries |  |
| Marketing |  |
| Project management |  |
| Software licenses |  |
| Total | $10 Billion |

* Brain Computer Interface, $7.5 billion from partnerships

|  |  |
| --- | --- |
| Office, computers, and office supplies | $ 0.5 Billion |
| Biomedical engineering staff | $ 3 Billion |
| Project management staff | $ 2 Billion |
| Facilities | $ 6 Billion |
| Research staff | $ 3 Billion |
| Fabrication materials | $ 5 Billion |
| Maintenance of the facilities | $ 2 Billion |
| Data warehouse systems | $ 2 Billion |
| Information technology specialists | $ 2 Billion |
| Total | $25 Billion |

* Communication app

|  |  |
| --- | --- |
| Planning costs | $ 10.000 |
| Salaries | $ 475.000 |
| Software licenses | $ 10.000 |
| Training costs to use tools | $ 5.000 |
| Total | $ 500.000 |

* Smart monitoring

|  |  |
| --- | --- |
| Software development | $500.000 |
| Hardware development | $750.000 |
| Total | $ 1.250.000 |

Tools: Timelines, KPIs, Goals and benefit interaction

Monitor the performance of the portfolio in the ongoing phase, the portfolio management board (or governance committee), write reports to better check the status of each portfolio component; the main objective of those reports is to support the decision-making process during the components execution to put in place proper modification and interventions modify the projects trend. The reports should contain the KPIs that are relevant for the corporate strategy and are aligned with it.

Portfolio actual components, relative KPIs and goals.

The maximum duration of the components is 10 years.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Expected  Outcome delivery | 1) WEB based collaboration application synergy benefit | 3) 3D printing Synergy benefit | 4) Augmented reality dashboard Synergy benefit (AUG) | 6) Artificial intelligence Synergy benefit  (ART) | 2) Smart monitoring system Synergy benefits | 5) Virtual reality Synergy benefit |

Each color in the below tables show the expected impact of a component on the others. The number before each name indicates the results from the prioritizing score sheet, and therefore which component should be completed before. Finally, each component starts to produce synergy benefits after its completion (blue column).

* There are mainly shown the revenues synergy benefit, it could be intended that other mainly benefits are the optimization of the SPI and CPI metrics that actually are used as portfolio KPIs.
* Communication app technology synergy benefit: the implementation of this technology will definitely lead to an anticipation of other projects outcomes an year before the expectations.
* 3D printing synergy benefit: will allow more discounts due to the cheap materials and costs savings, plus more customizable opportunities; that will boost the sales and help to reach the sales improving benefit before.

**3D printing project**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Benefit/KPI/Goal** | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|  |  | +2% revenues per year |  | +1% revenues per year |  |  |  |  |  |
| Revenues increase, Goal: +87 (40%) Mil/$ | 217  Bil/$ |  |  | Product lunch | +3% | +5% | +10% | +9% | +8.5% | +9.2% |
| Decrease of inventory carrying costs***/***Warehouse costs***/***2026  -35 Mil/$ | 150  Bil/$ | 152  Bil/$ | 153  Bil/$ | 150  Bil/$ | 145  Bil/$ | 142  Bil/$ | 138  Bil/$ | 129  Bil/$ | 120  Bil/$ | 115  Bil/$ |
| Decrease of raw material costs specifically waste**/**Cost of raw materia**l/**2026  -40% (95 Mil/E) | 130  Bil/$ |  | 143  Bil/$ | 143 Bil/$ | 140  Bil/$ | 135  Bil/$ | 122  Bil/$ | 100  Bil/$ | 98  Bil/$ | 95  Bil/$ |
| Decrease of shipping costs**/**Shipment costs**/**100 Mil/$ | 120  Bil/$ | 122  Bil/$ | 125  Bil/$ |  | 124  Bil/$ | 120  Bil/$ | 135  Bil/$ | 120  Bil/$ | 112  Bil/$ | 100  Bil/$ |

* The Communication App could help outcomes to be delivered with a year in advance

**Artificial intelligence project**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Benefit/KPI/Goal** | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|  |  |  |  |  |  |  |  |  |  |
| AI is the key technology to develop self-driving cars**/**Ai reliability and efficiency**/**2026 Self driving cars are on the market | AI develop starts | Ai completion 30% | Ai completion  50% | Ai completion 80% | Ai completion 100% |  |  |  |  |  |
| Energy management and energy consumption***/***Energy expanses***/***75 Mil/$ | 108  Bil/$ | 106  Bil/$ | 104  Bil/$ | 103  Bil/$ | 103  Bil/$ | 100  Bil/$ | 94  Bil/$ | 88  Bil/$ | 80  Bil/$ | 75  Bil/$ |
| Passenger Computer interface(PCI)***/***PCI impact level |  |  |  |  |  | Passenger entertainment dashboard creation |  | Social network account access | Face recognition for log-in and passenger profiling for driving style and preferences | Driver/customer based features |

* The Communication App could help outcomes to be delivered with a year in advance

**Augmented reality dashboard**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Benefit/KPI/Goal** | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|  |  | +2% revenues per year | +1% revenues per year |  |  |  |  |  |  |
| Customer loyalty***/*NPS*/*** c>=85% in 4 years | C=70% | C=70% | C=70% | C=75% | C=78% | C=80% | C=85% |  |  |  |
| **Sales increase over competitors*/***revenues from augmented cars***/***+9% |  |  | +9% (32 Mil/$) | +9% (32 Mil/$) | +9% (32 Mil/$) | +9% (32 Mil/$) | +9% (32 Mil/$) | +9% (32 Mil/$) |  |  |
| Market share/13.95% | 13.55% | 13.56% | 13.95% |  |  |  |  |  |  |  |
| Customer retention rate/+5% | 49% | 50% | 55%  (+5%) |  |  |  |  |  |  |  |

**NPS (Net Promoter Scope):** indicates the likeliness of a customer that refer and recommend the products to other potential customers. Scores clusters:

1. <6: Detractors
2. 7-8: Passives
3. 9-10: Promoter

* The Communication App could help outcomes to be delivered with a year in advance

**Virtual reality project**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Benefit/KPI/Goal** | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|  |  |  |  |  |  |  |  |  |  |
| Time decreasing for car design***/***Design time (from concept to prototype)***/***from 4 to 2 years | 4 years | 4 years | 4 years |  | 1st VR designed prototype car(reduction from 4 to 2 years) |  |  |  |  |  |
| Design cost reduction***/***-20% cost reduction in 3 years | $5.700.000 | $5.700.000 | $5415000(-5%) | $5301000 (-7%) | $51300000 (-10%) |  |  |  |  |  |
| VR test app to optimize assembling skills***/*** AVG Assembling time***/***-10% in 3 years |  |  | -3% | -7% | -10% |  |  |  |  |  |
| Maximum customization***/*** VR custom based design cars sold***/***+100% interactions that lead to contract in 3 years | 0 | 0 | 5300 new selling contract from web based customization | 7950 (3D printing technology available) new selling contract from web based customization | 10070 new selling contract from web based customization | 10600  (+100%) new selling contract from web based customization |  |  |  |  |

* The car design process requires (from the concept to the first prototype) at least 4 years with the actual technology, for the ready to market car 6 years are required.
* Average wage for a car designer $95.000 year in Europe. A team is made by 10, that means $9500000 year; in four years $3.800.000, $5.700.000 in six years.

**Brain Computer Interface**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Benefit/KPI/Goal** | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|  |  |  |  |  | Artificial intelligence synergy benefit |  |  |  |  |
| Reach the strategic position as innovator***/***Number of patents in BCI technology***/***60 till the lunch |  | +15 | +10 | +5 | +20 | +10 | +10 (60 total) | +20 | +7 | +8 |
| New partnership for the technology development***/***Co-investment level***/***-30% partner’s investments | 2 Bil/$ | $1.5 Bil/$ |  | $3 Bil/$ |  |  | 7.5 Bil/$ |  |  |  |
| Increase of the portfolio of products/new VW products with BCI/ 75% 2027 |  |  |  |  |  |  |  | 10% Car | 40%  Car+ wearables | 75%  Car+ health+ wearables |
| Patents licensed for different applications***/***Revenues from licensing***/***47 mil/$ per year 2026 | 7mil/$ | 10mil/$ | 18 mil/$ | 20 mil/$ | 22 mil/$ | 28 mil/$ | 35 mil/$ | 40 mil/$ | 42 mil/$ | 47  mil/$ |
| Brand reputation***/***global reputation rank***/***top-10 2026 | 100 | 95 | 80 | 78 | 75 | 60 | 55 | 35 | 19 | Top-10 |

* **The development of the artificial intelligence before the BCI will definitely help the R&D division in the completion of the technology, since the AI technology represent a consistent part of the BCI.**

**Web based collaboration application**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Benefit/KPI/Goal** | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|  |  |  |  |  |  |  |  |  |  |
| Improved productivity***/***Sales profit***/***$1.500.000 |  | $1.000.000 | $1.420.000 | $1.420.000 | $1.420.000 | $1.420.000 | $1.420.000 | $1.420.000 | $1.420.000 | $1.420.000 |

**Smart System Monitoring**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Benefit/KPI/Goal** | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|  |  |  |  |  |  |  |  |  |  |
| Sales revenues***/***Profits from SM app***/***$10000000 from the 2nd year |  |  | $10.000.000 | $10.000.000 | $10.000.000 | $10.000.000 |  |  |  |  |
| $10.000.000 | $10.000.000 | $10.000.000 | $10.000.000 | $10.000.000 |  |  |  |  |

* The Communication App could help outcomes to be delivered with a year in advance