Work Integrated Learning Programmes

BITS Pilani
Pilani | Dubai | Goa | Hyderabad

Computer Science & Information Systems

Topic – Assignment

Happy Data Project

BITS ID	NAME
2023ED15028	Arun K Babu
2023ED15005	Sreeya Sarkar
2023ED15010	Naveen A

Happy Data - Product Specification Document

1. Problem Statement and Goals

The Problem

In today's interconnected world, understanding the relationship between economic development and human happiness has become crucial. However, accessing and interpreting this data is challenging for students, researchers, and curious individuals. Current solutions either provide raw data without visualization or focus on single metrics without showing correlations.

We noticed during our research that most existing platforms are either too complex for educational use or too simplified to provide meaningful insights. Students studying development economics or sustainability often struggle to find platforms that can help them explore these relationships in an intuitive way.

Our Goals

Happy Data aims to bridge this gap by providing:

- An accessible platform for exploring happiness and development correlations
- Clear visualizations that help users understand complex relationships
- Educational insights for students studying sustainability and development
- A tool that promotes data-driven understanding of global well-being

2. Requirements Gathering Process

Approach

We followed a systematic approach to understand user needs through AI-assisted persona development and informal discussions.

AI-Assisted Persona Development and Requirements Analysis

We extensively used AI to roleplay different user types and systematically gather requirements:

Academic Researcher Persona:

- Needs: Detailed trend analysis, correlation insights, data export capabilities
- Pain points: Limited time to process raw data from multiple sources
- Goals: Research publications, teaching material preparation

High School Student Persona:

- Needs: Simple visualizations, clear explanations, mobile-friendly interface
- Pain points: Complex terminology, overwhelming data presentations
- Goals: School projects, general knowledge building

Curious Citizen Persona:

- Needs: Quick insights, country comparisons, intuitive navigation
- Pain points: Technical barriers, unclear data sources
- Goals: Personal learning, informed discussions

This process helped us identify that users want simplicity without sacrificing depth, and regional comparisons are particularly valuable for educational use.

3. Target User Personas

Primary Persona: Priya - The Development Studies Student

- **Age:** 21, Final year Economics student
- **Background:** Interested in sustainable development, working on thesis about happiness economics
- **Tech comfort:** Moderate, uses basic data tools but not programming
- **Goals:** Understanding correlation patterns, creating visualizations for presentations
- **Frustrations:** Existing tools are either too basic or require technical expertise
- **Quote:** "I need something that shows me the story behind the numbers"

Secondary Persona: Rahul - The Social Science Teacher

- **Age:** 35, Teaching social sciences at higher secondary level
- **Background:** 10 years teaching experience, passionate about global awareness
- **Tech comfort:** Basic to moderate, comfortable with educational technology
- **Goals:** Engaging classroom demonstrations, student project guidance
- **Frustrations:** Most platforms are not suitable for classroom use
- **Quote:** "My students learn better when they can see the data, not just read about it"

Tertiary Persona: Anjali - The Curious Professional

- **Age:** 28, Marketing professional with interest in global affairs
- **Background:** MBA graduate, follows international news and trends
- **Tech comfort:** High, comfortable with various online tools
- **Goals:** Personal learning, informed discussions with peers
- **Frustrations:** Finding reliable, easy-to-understand comparative data
- **Quote:** "I want to understand the world better, but I don't have time for complex research"

4. Key User Needs Analysis

Based on our research, we identified these critical user needs:

Functional Needs

1. **Trend Visualization:** Users want to see how indicators change over time for specific countries
2. **Correlation Analysis:** Understanding relationship between happiness and development indicators
3. **Regional Comparison:** Comparing countries within regions for better context
4. **Simple Interface:** Clean, intuitive design that doesn't overwhelm users
5. **Multiple Data Views:** Different visualization types for different analysis needs

Technical Needs

1. **Fast Loading:** Quick access to visualizations without long wait times
2. **Mobile Friendly:** Responsive design for different devices
3. **Reliable Data:** Consistent access to updated, accurate information
4. **Export Options:** Ability to save or share visualizations

Educational Needs

1. **Clear Labels:** Easy-to-understand terminology and explanations
2. **Context Information:** Background about data sources and limitations
3. **Guided Exploration:** Logical flow that helps users discover insights

5. User Stories and Product Backlog

Epic 1: Country Data Visualization (Priority: High)

User Stories:

1. As a student, I want to select a country from a dropdown so that I can focus on specific country analysis
2. As a researcher, I want to choose development indicators so that I can analyze specific metrics
3. As a user, I want to see trend line charts so that I can understand changes over time
4. As an educator, I want to display data for multiple years so that I can show historical patterns

Epic 2: Happiness Correlation Analysis (Priority: High)

User Stories:

1. As a student, I want to overlay happiness and indicator data so that I can identify relationships
2. As a researcher, I want dual-axis comparison charts so that I can analyze different scales together
3. As a user, I want to see correlation strength indicators so that I can understand relationship significance

Epic 3: Regional Happiness Analytics (Priority: Medium)

User Stories:

1. As an educator, I want regional happiness maps so that I can demonstrate global patterns
2. As a student, I want to compare happiness across regions so that I can understand regional differences
3. As a user, I want to filter by World Bank regions so that I can focus on specific areas

Epic 4: Regional Indicator Comparison (Priority: Medium)

User Stories:

1. As a researcher, I want to filter countries by region and year so that I can make fair comparisons
2. As a student, I want country comparison charts so that I can see relative performance
3. As a user, I want to rank countries within regions so that I can identify leaders and laggards

Epic 5: India Dashboard (Priority: Low - Extra Credit)

User Stories:

1. As an Indian student, I want India-specific dashboard so that I can focus on local context
2. As a researcher, I want year range filters so that I can analyze specific time periods
3. As a user, I want key India indicators displayed so that I can understand local happiness factors

Prioritization Rationale:

- High priority items enable core functionality needed by all user types
- Medium priority items add analytical depth for advanced users
- Low priority items provide specialized views for specific audiences

6. Proposed Functional Solution

Core Platform Features

1. Interactive Dashboard

- Clean, modern interface with intuitive navigation
- Country and indicator selection dropdowns with search functionality
- Dynamic chart generation based on user selections
- Responsive design for desktop and mobile use

2. Visualization Components

- Line charts for trend analysis over time
- Dual-axis charts for correlation comparison
- Regional maps for geographical context
- Bar charts for country comparisons within regions

3. Data Integration

- Real-time data fetching from World Bank API
- Integration with World Happiness Report data
- Automatic data validation and error handling
- Caching mechanism for improved performance

4. User Experience Features

- Loading indicators for data processing
- Clear error messages for failed operations
- Help tooltips for complex features
- Export functionality for charts and data

User Journey Flow

1. **Landing Page:** User understands platform purpose and capabilities
2. **Country Selection:** User chooses country of interest
3. **Indicator Selection:** User picks development indicator to analyze
4. **Visualization Generation:** System displays relevant charts
5. **Analysis Enhancement:** User can add happiness correlation, change time periods
6. **Regional Context:** User can switch to regional view for broader comparison
7. **Export/Share:** User can save insights for later use

7. System Architecture

Frontend: Web Application

- Plain HTML, CSS, and JavaScript for maximum compatibility
- Responsive CSS3 for mobile-friendly design
- Chart.js for interactive visualizations
- Vanilla JavaScript for DOM manipulation and API calls

Backend: Django Framework

- Django REST API for data processing and management
- Models for storing processed data and user sessions
- Views for handling API requests and serving frontend
- Django ORM for database operations

Database:

- SQLite for development
- Stores processed World Bank data for faster access
- Caches happiness report data to reduce external API calls

Data Sources:

- World Bank Indicators API (primary development data)
- World Happiness Report data (happiness metrics)
- World Bank Country Classification (regional groupings)

Data Flow

1. User accesses Django application → Django serves HTML templates
2. Frontend JavaScript makes AJAX calls → Django API endpoints process requests
3. Django fetches data from database or external APIs → Data processed and returned as JSON
4. Frontend receives JSON data → Chart.js renders visualizations
5. User interactions trigger new API calls → Dynamic updates without page refresh

8. Technical Considerations and Constraints

Technology Stack Rationale

- **Django:** Robust Python framework with excellent API capabilities and ORM
- **Plain HTML/CSS/JS:** Maximum compatibility, no framework dependencies, easier debugging
- **Chart.js:** Free, well-documented charting library with good mobile support
- **SQLite:** Reliable database options, SQLite for development
- **Django REST Framework:** Clean API development with built-in serialization

Technical Constraints

- **External API Dependencies:** Reliant on World Bank API availability and rate limits
- **Data Processing:** Backend handles data transformation, frontend focuses on presentation
- **Database Storage:** Need to manage data updates and synchronization with external sources
- **Session Management:** Django handles user sessions and temporary data storage
- **Deployment:** Requires server environment capable of running Django applications

Scope Limitations

In Scope:

- 5 core visualization types as specified
- Basic data filtering and selection
- Responsive web interface
- Export functionality for charts

Out of Scope:

- User authentication and personalization
- Data upload/import functionality
- Advanced statistical analysis
- Real-time data updates
- Mobile app development

10. Next Steps

Phase 2 Preparation

1. **Design Document Creation:** Detailed technical specifications
2. **Technology Setup:** Development environment and tool selection
3. **Sprint Planning:** Breaking down user stories into development tasks
4. **Quality Assurance:** Testing strategy and acceptance criteria definition

Implementation Priority

1. **Core Infrastructure:** Basic application structure and API integration
2. **Primary Visualizations:** Country trends and happiness correlation features
3. **Regional Analytics:** Map-based and comparison visualizations
4. **User Experience:** Polish, error handling, and export functionality
5. **India Dashboard:** Extra credit feature if time permits

This specification serves as our roadmap for Phase 2 development, ensuring we build a product that truly serves our identified user needs while staying within technical and time constraints.
