

SurfnOnline

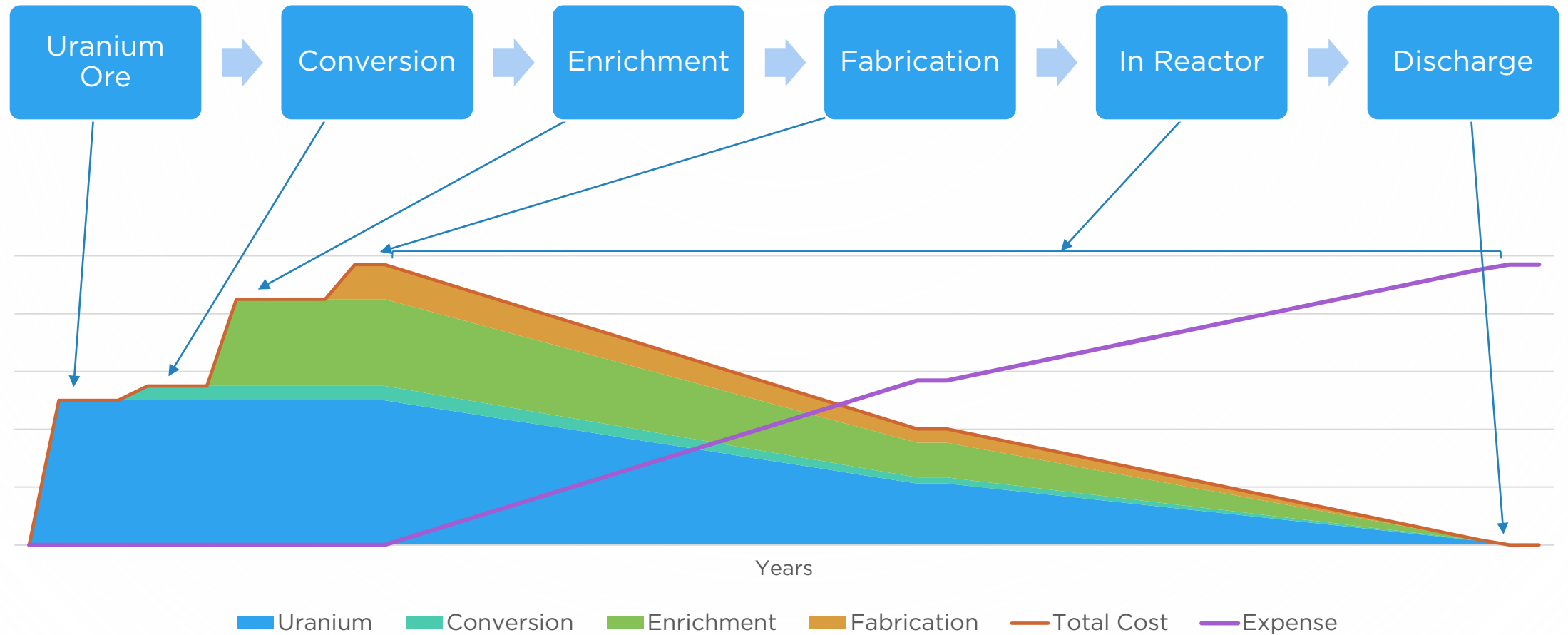
for

Nuclear Fuel Cycle Management



NUFMAP is a servicemark of HTH Associates, Inc.

Nuclear Fuel Cycle



Managing Nuclear Fuel with SurfnOnline

Out of Core

In Reactor

Fuel Management

- Multi-Cycle Core Loading Plan
- Fleet Fuel Commodity Procurement Plan
- Capital Fuel Cash Requirements
- Corporate/Variance Reports

- Energy Requirements & Cycle Lengths
- Assembly Burnup Projections
- Projected Monthly Fuel Expense Rates

Accounting

- Invoice Processing
- Subsidiary Ledger for Nuclear Fuel Transactions
- General Ledger Interface

- Assembly Cost Allocation
- Fuel Expense & Amortization
- Assemblies Fully Amortized at Discharge

SurfnOnline License - What's Included?

- The most detailed nuclear fuel forecasting tools available in the industry
- Controlled worldwide access from anywhere for any designated user
- Rapid response to support fuel cycle management decisions
- Security of sensitive information - all data is stored encrypted in the cloud
- Works with all browsers on any desktop, laptop, tablet, or phone
- Access to experts to assist in assessing forecast details, arranging forecast scenarios, troubleshooting input
- Membership in an engaged user community

SurfnOnline License - New Fleet Setup

- **Data Gathering:**
 - Plant operational data (power rating, forecasted capacity factors, etc.)
 - Core design source information (physics source files)
 - Fuel contract key commercial information (pricing, terms, purchase lead times, etc.)
 - Starting cost/quantity balances (out of core, in reactor)
 - Any other costs that are applied to fuel (engineering support, etc.)
- **Confirmation of input**
 - Huxtable Consulting develops the initial model for review and approval
 - On-site training provided on how to use and update SurfnOnline model

SurfnOnline Support

- **Brian Huxtable**

- Huxtable Consulting LLC (est. 2017)
 - Email: brian.huxtable@hthassoc.com / brian@huxtableconsulting.com
 - Phone: 651-399-0832
- Developer of SurfnOnline and maintainer of NUFMAP for over 20 years

- **Dr. John A. Hughes**

- HTH Associates, Inc
 - Email: john.hughes@hthassoc.com
- PhD Thesis: *Methods of Nuclear Fuel Management for Utilities* (1975)
- Developer of NUFMAP and project lead for 40 years

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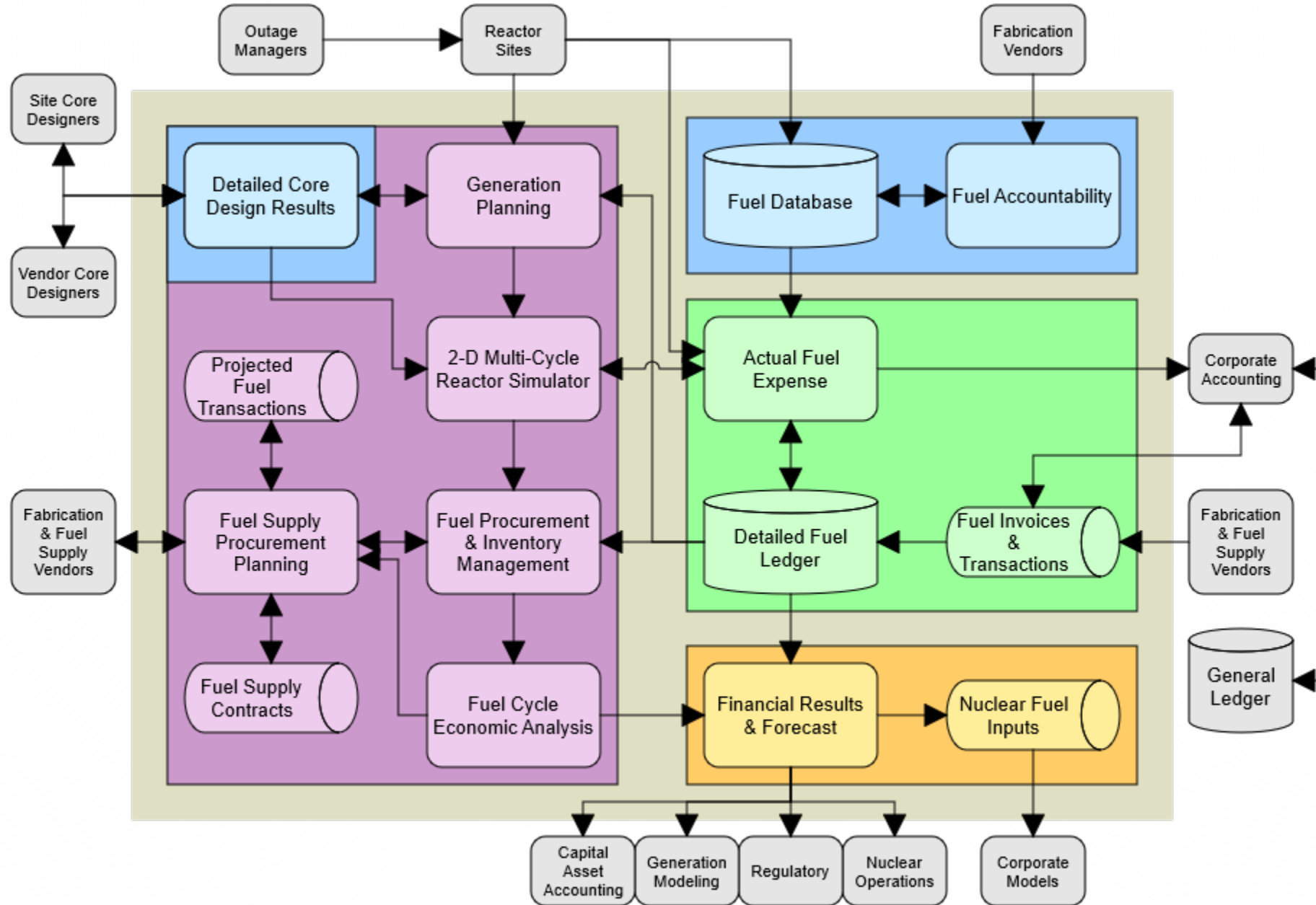
Background



NUFMAP - SurfnOnline Calculation Engine

- **NUFMAP - Nuclear Fuel Management and Accounting Process**
 - **The most detailed nuclear fuel forecasting tools available in the industry**
 - **Over 40 years of industry experience**
 - **Currently in regular use by five nuclear operators and owners**
- **Fuel Management**
 - GEM PACKAGE general purpose economic modeling
 - **Accounting**
 - SNAP-FINANCE assembly expense amortization and subsidiary ledger
 - **Integration**
 - Modular design
 - Fuel Management provides assembly projections for Accounting
 - Accounting actuals are starting point for Fuel Management

SurfnOnline - Integrated Nuclear Fuel Management & Accounting Process



Key NUFMAP Fuel Management Modules

- **GEM PACKAGE**

- GEM-GPM (Generation Planning)
 - Monthly Reactor Generation
- LPGEN (Loading Pattern Generation)
 - Create GEM-XY Input from Core Simulator Results
- GEM-XY (2D-Multi Cycle Simulator)
 - Multi-Cycle Core Loading Requirements
 - Assembly Monthly Burnups
- GEM-ESM (Enhanced Supply Module)
 - Fuel Commodity Procurement Plan
 - Capital Fuel Cash Requirements
- GEM (General Economic Model)
 - Monthly Nuclear Fuel Expense Rates
 - Nuclear Fuel Information for Corporate Use

- **Where used**

- Regulated utilities
- Merchant plants

- **How Used**

- Fuel cycle economics
- Optimize multiple unit fleets
- Justification of rates to regulators
- Impact of plant changes
- Optimized fuel cycle design
- Commodity procurement decisions
- Resource planning
- Total production costs

Key NUFMAP Accounting Modules

- **SNAP-Finance**

- PRO Tools (PROGEN, PROPAC, PROLIM, etc.)
 - Fuel Expense and Amortization
 - Amortization Database Management
- INTRAC
 - Subsidiary Ledger for Nuclear Fuel
 - Database of Invoices and Commodity Balances
- REPORT
 - Ad-hoc Reporting for Subsidiary Ledger
- NUTRAC/PROTRC
 - Fuel Accountability
 - Assembly Cost Calculation and Allocation
- TRANSESM
 - Inventory Lot Balances from Subsidiary Ledger

- **Where used**

- Regulated utilities
- Merchant plants

- **How Used**

- Monthly fuel closing
- Adjust expense rates in response to operations
- Fully expense assemblies at discharge
- Fuel transaction database
- Corporate reporting/variance reports
- Resource utilization
- Total production costs